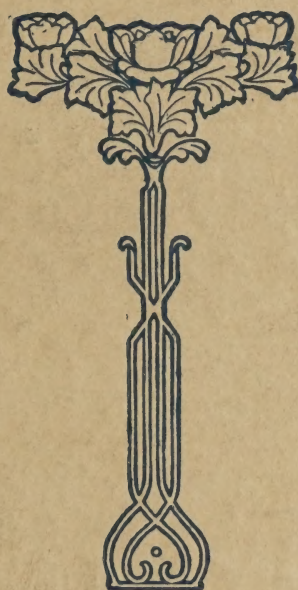


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1920

PROCEEDINGS OF THE  
FLORIDA STATE  
HORTICULTURAL  
SOCIETY *for* 1920

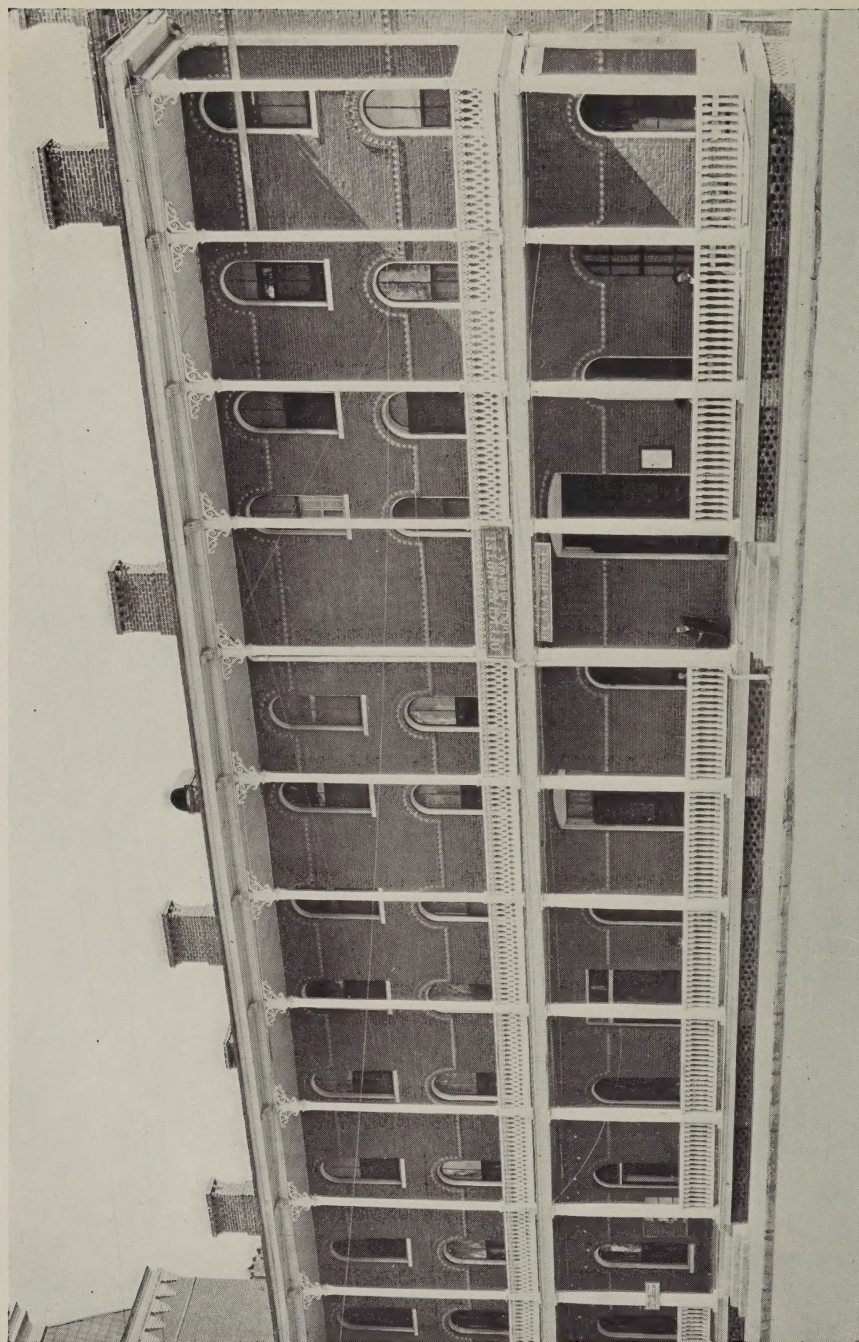


PUBLISHED BY THE SOCIETY









THE OCALA HOUSE — BIRTHPLACE OF THE SOCIETY



PROCEEDINGS  
OF THE  
THIRTY-THIRD ANNUAL  
MEETING

OF THE  
FLORIDA STATE  
HORTICULTURAL SOCIETY

HELD AT  
OCALA, FLA., MAY 4, 5, 6, 7

1920



PUBLISHED QUARTERLY BY THE SOCIETY  
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PROCEEDINGS

OF THE

THIRTY-THIRD ANNUAL

MEETING

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HORTICULTURAL SOCIETY

1910

THE E. O. PAINTER PRINTING CO. DE LAND, FLA. N° 13476



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1920

# *Florida State Horticultural Society*

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## OFFICERS ELECT FOR 1920

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### PRESIDENT:

H. HAROLD HUME, Glen St. Mary.

---

### VICE-PRESIDENTS:

L. B. SKINNER,  
Dunedin.

W. J. KROME,  
Homestead.

S. F. POOLE,  
Lake Alfred.

---

### SECRETARY:

BAYARD F. FLOYD, Gainesville.

---

### TREASURER:

W. S. HART, Hawks Park.

---

### EXECUTIVE COMMITTEE.

P. H. ROLFS, Gainesville; E. S. HUBBARD, Federal Point;

L. D. NILES, Lucerne Park, President, Secretary and Treasurer, ex-officio.

# Constitution

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Article 1. This organization shall be known as The Florida State Horticultural Society, and its object shall be the advancement of Horticulture.

Article 2. Any person may become an annual member of the Society by subscribing to the Constitution and paying one dollar. Any person may become a perennial member of the Society by subscribing to the Constitution and paying the annual dues for five or more years in advance. Any person may become a life member of the Society by subscribing to the Constitution and paying twenty-five dollars. Any person or firm may become a patron of the Society by subscribing to the Constitution and paying one hundred dollars.

Article 3. Its officers shall consist of a President, three Vice-Presidents, Secretary, Treasurer, and Executive Committee of three, who shall be elected by ballot at each annual meeting. After the first election their term of office shall begin on the first day of January following their election.

Article 4. The regular annual meeting of this Society shall be held on the second Tuesday in April, except when otherwise ordered by the Executive Committee.

Article 5. The duties of the President, Vice-President, Secretary and Treasurer shall be such as usually devolve on those officers. The President, Secretary and Treasurer shall be ex-officio members of the Executive Committee.

Article 6. The Executive Committee shall have authority to act for the Society between annual meetings.

Article 7. The Constitution may be amended by a vote of two-thirds of the members present.

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## By-Laws

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1. The Society year shall be co-extensive with the calendar year, and the annual dues of members shall be one dollar.

2. All bills authorized by the Society or its Executive Committee, for its legitimate expenses, shall be paid by the Secretary's draft on the Treasurer, or K'd by the President.

3. The meetings of the Society shall be devoted only to Horticultural topics, from scientific and practical standpoints, and the Presiding Officer shall rule out of order all motions, resolutions and discussions tending to commit the Society to partisan politics or mercantile ventures.

4. All patron and life membership dues and all donations, unless otherwise specified, shall be invested by the Treasurer in United States bonds. Only the interest on these bonds shall be available for payment of the current expenses of the Society. Perennial membership dues shall be placed on deposit at interest by the Treasurer. Only one dollar and the interest from each perennial membership fee shall be available for use in payment of the current expenses of the Society during any particular year.





FLORIDA STATE  
HORTICULTURAL SOCIETY  
QUARTERLY



VOL. XXXIII No. 1, 2, 3

DECEMBER, 1920

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# List of Members

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## HONORARY MEMBERS

Hart, W. S., Hawks Park, Fla. Gaitskill, S. H., McIntosh, Fla.  
Taber, Geo. L., Glen St. Mary, Fla.

---

## PATRON MEMBERS

Florida Citrus Exchange, Tampa, Fla.	Glen St. Mary Nurseries Co., Glen St. Mary, Fla.
Mills, The Florist, Jacksonville, Fla.	Buckeye Nurseries, Tampa, Fla.
American Fruit Growers, Inc., Orlando, Fla.	American Agricultural Chemical Co., Jacksonville, Fla.
Hart, W. S., Hawks Park, Fla.	E. O. Painter Fertilizer Co., Jacksonville, Fla.
Van Fleet Co., Winter Haven, Fla.	Wilson & Toomer Fertilizer Co., Jacksonville, Fla.
Thomas Advertising Service, Jacksonville, Fla.	Deerfield Groves Co., Wabasso, Fla.
Chase & Co., Jacksonville, Fla.	Southern Crate Manufacturers Assn., Jacksonville, Fla.
Skinner, L. B., Dunedin, Fla.	Hastings Seed Co., Atlanta, Ga.
Florida Grower Publishing Co., Tampa, Fla.	J. Schnarr & Co., Orlando, Fla.
Gulf Fertilizer Co., Tampa, Fla.	Armour Fertilizer Works, Jacksonville, Fla.
Exchange Supply Co., Tampa, Fla.	

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## LIFE MEMBERS

Alderman, A. D., Bartow, Fla.	Champlain, A. E., R. F. D. No. 1, Palmetto, Fla.
Allan, Wm., 136 W. 79th St., New York, N. Y.	Charles, Rt. Rev. Abbott, St. Leo Abbey, St. Leo, Fla.
Allan, A. W., Avon Park, Fla.	Chase, Joshua C., Jacksonville, Fla.
Allan, Mrs. Wm., 136 W. 79th St., New York, N. Y.	Chidester, D. D., 446 S. Painter Ave., Whittier, Cal.
Anderson, Frank K., Citizens Bank Bldg., Tampa, Fla.	Christianey, Cornelius, Port Orange, Fla.
Andrews, C. W., John Crerar Library, Chicago, Ill.	Clement, Waldo P., Georgiana, Fla.
Baltram, Francisco, Monterey, N. L., Mexico.	Clute, F. R., Apartment 202, M St., N. W., Washington, D. C.
Barber, C. F., Macclenny, Fla.	Conner, W. E., 31 Nassau St., New York City.
Bardin, A. J. Zolfo, Fla.	Conner, Wayne E., New Smyrna, Fla.
Bartholomew, Tracy R., 412 Farmington Ave., Hartford, Conn.	Cook, R. F. E., Leesburg, Fla.
Bartlett, A. F., St. Petersburg, Fla.	Cornell, H. E., Winter Haven, Fla.
Bartlum, W. Leonard, Fla. Agricultural Supply Co., Drawer 1010-a, Jacksonville, Fla.	Cresson, W. H., City Point, Fla.
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Carpenter, G. F., 50 Beck St., Attleboro, Mass.	Ellsworth, W. J. Blanton, Fla.

- Fairchild, David, Bureau of Plant Industry, Washington, D. C.  
 Francis, Chas. Jr., Interlachen, Fla.  
 Frink, Aubrey, Berlin, Fla.  
 Fugazzi, John, care of Fugazzi Bros., Cincinnati, O.
- Gifford, John, Coconut Grove, Fla.  
 Gillett, M. E., Tampa, Fla.  
 Gillett, D. C., Tampa, Fla.  
 Gossard, Prof. H. A., Experiment Station, Wooster, Ohio.  
 Gushee, E. G., 2830 W. Lehigh Ave., Philadelphia, Pa.
- Haden, Mrs. Florence P., Coconut Grove, Fla.  
 Hakes, L. A., Winter Park, Fla.  
 Hastings, H. G., 16 West Mitchell St., Atlanta, Ga.  
 Hempel, H. A., Gotha, Fla.  
 Henricksen, H. C., Agricultural Exp. Station, San Juan, Porto Rico.  
 Hentz, W. B., Winter Haven, Fla.  
 Herff, B. Von, Hershey Arms, Los Angeles, Cal.  
 Hernandez, Pedro M., 108 Cienfuegos, San Fernando, Cuba.  
 Hill, E. M., Nueva Gerona, Isle of Pines, Cuba.  
 Hollingsworth, G. S., Arcadia, Fla.  
 Hooper, I. A., Orlando, Fla.  
 Hubbard, E. S., Federal Point, Fla.  
 Hume, H. Harold, Glen St. Mary, Fla.  
 Hutchison, R. H., 51 Front St., New York City, N. Y.
- Johnston, S. W., DeLand, Fla.
- Kerr, Dr. Geo., 325 Armstead Ave., Hampton, Va.  
 Krome, W. J., Homestead, Fla.
- Lassen, H. C., Bean Spray Pump Co., San Jose, California.  
 Lauman, G. N., Ithaca, N. Y.  
 Leonard, George V., Hastings, Fla.  
 Lewis, Dr. Fred D., 188 Franklin St., Buffalo, N. Y.  
 Livingston, Dr. Alfred, Jamestown, New York.  
 Love, Ozor T., 68 Grove St., Plainfield, N. J.
- Mackay, Alexander, Glencruitten, Oban, Argyllshire, Scotland.  
 Marine, Peter, Sneads Island, Fla.  
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 Neville, H. O., Lonja Del Comercio, 542, Havana, Cuba.  
 Niles, L. D., Lucerne Park, Fla.  
 Norvenland Fruit Co., San Juan, Porto Rico.
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 Ohmer, C. J., W. Palm Beach, Fla.  
 Olsen, Olaf, White City, Fla.
- Painter, Mrs. E. O., Jacksonville, Fla.  
 Patton, E. F., Box 573, Dawson, Canada.  
 Pennock, Henry S., Jupiter, Fla.  
 Pike, W. N., Blanton, Fla.  
 Porcher, E. P., Cocoa, Fla.  
 Porcher, Mrs. E. P., Cocoa, Fla.  
 Prange, Mrs. Nettie M. G., Jacksonville, Fla.
- Racey, C. H., Jensen, Fla.  
 Radel, Edw. H., 1418 Avenue K, Miami, Fla.  
 Raulerson, L. Ed, Lily, Fla.  
 Ricketson, Mrs. M. C., "Grayfield," Fernandina, Fla.  
 Robinson, M. F., Sanford, Fla.  
 Rolfs, Prof. P. H., Bello Horizonte, State of Minas Geraes, Brazil.  
 Rolfs, Mrs. P. H., Bello Horizonte, State of Minas Geraes, Brazil.
- Sample, J. W., Haines City, Fla.  
 Sandlin, A. R., Leesburg, Fla.  
 Sellards, Dr. E. H., Tallahassee, Fla.  
 Shepherd, Louis H., P. O. Box 175, DeLand, Fla.  
 Smith C E., Bogwalk, Jamaica.  
 Sneden, W. C., Jensen, Fla.  
 Snow, G. E., 73 W. Bellevue Drive, Pasadena, Cal.  
 Sparavath, R. M., Englandsglade, 37, Esbjerg, Denmark.  
 Stanton, F. W., Dock and Walnut Sts., Philadelphia, Pa.  
 Stevens, Edmund, Verge Alta, Porto Rico.  
 Strauss, J. E., Plant City, Fla.  
 Stuart, L. E., Montemorelos, Mexico.
- Temple, Mrs. W. C., Winter Park, Fla.  
 Thomas, Jefferson, Jacksonville, Fla.  
 Towns, Thomas R., Holguin, Cuba.  
 Trelease, Wm., University of Illinois, Urbana, Ill.  
 Trueman, R. B., Jacksonville, Fla.
- Waite, F. D., Palmetto, Fla.  
 Wester, P. J., Bureau of Agriculture, Manila, Philippine Islands.  
 White, C. G., Haiku, Maui Island, Hawaii.  
 Williams, E. S., Ft. Pierce, Fla.



Wilson, L. A., Jacksonville, Fla.  
 Wirt, E. L., 45 Pearl St., Bartow, Fla.  
 Woodroffe, Mr., Auckland, New Zealand.

Worcester, C. H., Pomona, Fla.

Yieta, Ferro, Dr. B. E., Havana, Cuba.  
 Yothers, W. W., Orlando, Fla.

## ANNUAL MEMBERS OUT OF THE STATE

- Adams, B. F., 5606 N. Masher St., Philadelphia, Pa.  
 Adams, Chas. W., 161 Griswold St., Detroit, Mich.  
 Adams, V., 7216 Elton Ave., Cleveland, Ohio.  
 Agricultural Experiment Station, Santiago, De la Vegas, Cuba.  
 Alconis, Albert, 4148 W. Campbell Ave., Chicago, Ill.  
 Anderson, L. R., Holly Springs, Miss.  
 Anderson, Robt., 35 West LaCrosse Ave., Lansdowne, Pa.  
 Angermann, Henry, 1818 Montgall Ave., Kansas City, Mo.  
 Anthony, Lucinda P., Garland, Me.  
 Apkir, S. R., 323 Ford Ave., Highland Park, Mich.  
 Austin, Wm., R. F. D. 2, Royal Park, Mich.  
 Baird, J. H., Galesburg, Ill.  
 Baker, W. C., 209 Ann St., Elgin, Ill.  
 Ballard, Mrs. S. Thurston, Landowne, Glenview, Ky.  
 Barber, Allen, Box 1, Lancaster, Neb.  
 Barr, Mrs. W. A., 744 Independence Blvd., Chicago.  
 Bartholomew, G. W., 177 Sigourney, Hartford, Conn.  
 Bartlett, Merrill, 906 Metropolitan Life Bldg, Minneapolis, Minn.  
 Bateson, Horace, 646 Century Bldg., St. Louis, Mo.  
 Bean Spray Pump Co., Lansing, Mich.  
 Beckwith, Harry, 26 Fern St., New Castle, Pa.  
 Bein, Walter F., 841 42d St., Rock Island, Ill.  
 Beindorf, Wm. C., 317 W. Sargent St., Litchfield, Mass.  
 Bissell, Mary C., 37 Davis Ave., New Rochelle, N. Y.  
 Blackford, James A., 512 N. Main St., Decatur, Ill.  
 Blair, Frank, 145 E. 39th St., New York.  
 Blair, Holmes, 117 Com. Bank Bldg., Charlotte, N. C.  
 Bouner, Chas., 5752 Harper Ave., Chicago.  
 Bridewell, T. J., 1144 Garfield Ave., Kansas City, Mo.  
 Brodie, James, R. R. 2, Biloxi, Miss.  
 Brockman, John D., care of American Commercial & Savings Bank, Davenport, Iowa.  
 Brooks, Paul Andros, 1120 Plymouth Bldg., Minneapolis, Minn.  
 Bukac, Frances, 350 S. Grand Ave., Pasadena, Cal.  
 Burgin, Minnie E., Philadelphia, Pa.  
 Caples, R. R., care of Willys-Overland Co., Toledo, Ohio.  
 Caravascious, Peter G., 305 S. Warren St., Syracuse, N. Y.  
 Carmienche, Mrs. Julia, 135 Prospect Park West, Brooklyn, N. Y.  
 Carpenter, W. D., Nantucket, Mass.  
 Cason, Edgar B., Cynthiana, Ky.  
 Chambers, R. E., Roberts, Ill.  
 Chance, C. W., 2 South 15th St., Philadelphia.  
 Chapman, Wm. H., 16 E. 45th St., Kansas City, Mo.  
 Chute, George M., 2222 Lawrence Ave., Toledo, Ohio.  
 Clapp, Sidney K., Delaware Co., Grand Gorge, N. Y.  
 Chilton, W. J., Byrdstown, Tenn.  
 Clark, A. T., Box 7, Amityville, Long Island, N. Y.  
 Clark, Robt. F., 94 Orange St., Westfield, Mass.  
 Clark, W. A., 523 Woodland Ave., Duluth, Minn.  
 Clark, Wm. Edwin, 69 Newbury St., Boston, Mass.  
 Clarke Thomas Shields, 7 West 43d St., New York.  
 Claxton, Amos, Box 1602 Goodland, Kansas.  
 Close, Phillip H., Belaer, Md.  
 Cobb, A. W., care The Udell Wks., Indianapolis, Ind.  
 Cobb, N. O., 51 Mudge St., East Lynn, Mass.  
 Collins, S. H., Beechurst, Long Island, N. Y., winter address care Lakeland Highland, Lakeland.  
 Compton, J. C., Whiting, Ind.  
 Compton, R. O., Whiting, Ind.  
 Commander, A., 5016 Magazine St., New Orleans, La.  
 Connelly, H. B., 53 W. Jackson Blvd., Chicago.  
 Corrigan, Owen, 165 Lakeview Ave., Youngstown, Ohio.  
 Covall, M. W., 825 21st St., N. W., Washington, D. C.  
 Craig, James, 154 Geneva Ave., Highland Park, Mich.  
 Crane, Chas. A., 1651 Park Ave., Racine, Wis.  
 Crosthwait, L. M., Bloomington, Ill.  
 Crosse, Theodosia, Curtis Hotel, Minneapolis, Minn.  
 Cunne, J. H., San Antonio.  
 Currier, Oceola, 41 9th Ave., Newark, N. J.  
 DaCosta, Herman, 3d National Bank Bldg, St. Louis, Mo.  
 Daspit, P. J., Box 684 Houma, La.  
 Dearing, Chas., U. S. Dept. of Agri., Washington, D. C.

- Dean, John M., 785, Westminster St., Providence, R. I.
- De Blanche, A., Portland, Oregon.
- DeGive, L., Estate, 205 Grand Opera Bldg, Atlanta.
- Dehlinger, A. J., 118 Southern Ave., Latonia Sta., Covington, Ky.
- Dahm, Estelle V., Winnetka, Ill.
- Dalrymple, Chester W. W., 16 Pleasant St., Wakefield, Mass.
- Donald, James, 4118 N. Tripp Ave., Chicago.
- Doppelheuer, Ferd., Connellville, Pa.
- Dorsey, L. M., 1420 Thompson St., Philadelphia, Pa.
- Doty, Steward W., care Beach Wiskham Grain Co., 543 Postal Tel. Bldg., Chicago, Ill.
- Draemer, O. C., 4923 Alhambra Ave., Govans, Baltimore, Md.
- Dreier, W. C., Hatillo Fruit Co., Rio Piedras, P. R.
- Dreier, W. C., Rio Piedras, P. R.
- Drowne, George P., Morrisville, Vt.
- Duerr, G., 758 8th St., Secaucus, N. J.
- Edson, J. T., 686 Ridge St., Newark, N. J.
- England, Miss Martha L., 2800 Perrysville Ave., Pittsburg, Pa.
- Estill, P. F. Towanda, Pa.
- Fairchild, David, care U. S. Dept. Agri., Bureau of Plant Industry, Washington, D. C.
- Farman, E. H., McKittrich, Cal.
- Fechtig, Dr. St. George, 35 Madison Ave., New York, N. Y.
- Fielding, E. B., 1512 Birchwood Ave., Chicago.
- Fischer, Bernard, Oak Lane, Philadelphia, Pa.
- Fisher, H. T., Suite 1613 Williamson Bldg, Cleveland, Ohio.
- Fletcher, H. M., 623 Rose Bldg., Cleveland, Ohio.
- Flint, Dr. G. C., 706 Huntington Ave., Boston, Mass.
- Flitercraft, A. J., 609 Maple Ave., Oak Park, Ill.
- Flutka, Frank A., 142 Produce Ave., Philadelphia.
- Flynn, John, 221 West 63d St., Chicago.
- Ford, J. E., State Lake Bldg., Chicago.
- Fowle, Sir Walter Hamilton, Pretoria Club, Pretoria, South Africa.
- Foster, W. C., Zatta, S. C.
- Franklin, W. S., 41 Kirkland St., Cambridge, Mass.
- Freer, L. H., 1302 Heath Ave., Chicago.
- Frost, H., 10 S. LaSalle St., Chicago, Ill.
- Gardiner, H. B., Box 589, Fall River, Mass.
- Gilbert, D. W., Dublin, Ga.
- Gill, P. C., Marvel, Ala.
- Goldberger, Arthur, care of American Fruit Grower, State Lake Bldg., Chicago.
- Good, Will H., Tiffin, Ohio.
- Gordwood, Kennet J., 311 Wall St., Bethlehem, Pa.
- Green, Payne G., 106 Ressex Apt., 34 Chestnut St., Philadelphia, Pa.
- Gribbal, John, 1513 Race St., Philadelphia, Pa.
- Grimes, D. W., Agricultural College, Miss.
- Gumbrecht, A. J., 79 55th St., Corona, N. Y.
- Hager, E. B., Bellton, W. Va.
- Haigh, C. H., 1450 Woolworth Bldg., New York City.
- Hall, H. W., Grand Bay, Ala.
- Hale, Chas. E. A., Route A, Box 30, Savannah, Ga.
- Hammill, S. J., Conneaut, Ohio.
- Hands, C. A., 253 N. 18th St., Philadelphia, Pa.
- Hankins & Nelson, Allentown, N. J.
- Hanson, Chas., 4701 Ohio St., Chicago.
- Harper, Dr. R. N., Rhodes Bldg., Atlanta, Ga.
- Hartman, Richard, Kremmling, Colo.
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- Hastings, W. S., Somers, Conn.
- Helander, Carl, 29 William St., Hartford, Conn.
- Henderson, C. W., Flemingsburg, Ky.
- Harrison, Miss M. E., Hood College, Frederick, Md.
- Hendrick, A. C., San Juan, Porto Rico, care P. R. Fruit Exchange.
- Henry, Herbert C., care Luz Co., Lock Box 552, Nescopch, Pa.
- Henry, Jr., 401 Bank of Nova Scotia, Vancouver, B. C.
- Henning, Henry, Mt. Olive, Pittsburg, Pa.
- Hessilgrove, S. S., 524 Lowry Bldg., St. Paul, Minn.
- Heuer, Wm. H., 326 W. Madison St., Chicago, Ill.
- Higley, W. M., 925 N. Y. Life Bldg., Minneapolis, Minn.
- Hill, J. S., 2510 22d Ave., N. Birmingham, Ala.
- Hill, R. E., 1825 14th Ave., N. Birmingham, Ala.
- Hobbs, E. W., 441 Church St., Millersburg, Pa.
- Hodel, Gilbert S., 209 15th St., Sharpsburg, Pa.
- Holt, Edward Q., West Easton, Pa.
- Holt, Frank L., 165 Broadway, New York.
- Hovey, A. L., 404 South Drury Ave., Kansas City, Mo.
- Huber, F. Jr., Jennings, La.
- Huger, W. Jervy, 49 Wall St., New York City.
- Hutchinson, A., 235 W. 66th St., New York City.
- Inslee, C. L., 140 Cedar St., New York, N. Y.
- Iowa State College of Agriculture & Mech. Arts, Ames, Iowa.
- Jackson, Geo. L., Gold Butte, Mont.
- Jameson, R. D., R. F. D. 2, Sicklerville, N. J.
- Jervey, Huger W., 49 Wall St., New York City.
- Jodon, D. W., Fremont, Neb.
- Johnson, James G., East Tenn. Bank Bldg., Knoxville, Tenn.
- Johnson, O. W., 716 Race St., Rockford, Ill.
- Jones, Dr. W. D., Devils Lake, N. D.
- Jones, Ward M., Ames, Iowa.
- Joslin, Dr. J. H., 816½ Quarrier St., Charleston, W. Va.
- Julich, John, 1011 Tiffany St., New York, N. Y.
- Junkins, J. C., Grand Bay, Ala.



- Kauffman, E. A., 47 Caroline St., Lancaster, Pa.  
 Kendig, John, 1220 Market St., Philadelphia.  
 Kent, E. W., Colorado Springs, Colo.  
 Keller, H. S., care Homer Furnace Co., Coldwater, Mich.  
 Kimbro, B. N., Jacksonville, Texas.  
 Klein, J. Allen, Box 264, Camden, N. J., Florida address Roseland.  
 Kloth, H. E., Hamilton Co., Glendale, Ohio.  
 Kraemer, Eugene, 2724 Troost Ave., Kansas City, Mo.  
 Kresse, Chas. G., 37 Gesner Ave., South Nyack, N. Y.  
 Kreyseker, Louis, Harvey, Ill.  
 Larrabee, Herbert S., 25 Upton St., Boston, Mass.  
 Lee, N. H., R. F. D. No. 1, Conneaut, Ohio.  
 Lehmann, Karl, 5 Ferger Bldg., Chattanooga, Tenn.  
 Lester, J. Dan, Cortland, N. Y.  
 Lestina, Otto, Newport, Ky.  
 Lilly, J. M., Fayetteville, N. C.  
 Little, H. G., 1205 Cosdon Bldg., Tulsa, Okla.  
 Lord, Henry J., Stepney Depot, Connecticut.  
 Loudon, H. R., 80 Williams St., New York, N. Y.  
 Loudon, Jas. S., 723 Grain T'xchange, Winnipeg, Manitoba, Canada.  
 Lower, J. E., 1452 Catalpa Ave., Chicago.  
 Lucas, Stanley B., Box 87, Sta. D., Cleveland, O.  
 Lurton, Geo. F., 47 Brevort Place, Brooklyn, N. Y.  
 Lykes, Fred E., Apartado 788, Habana, Cuba.  
 Macdonald, Colin, Grand Bay, Ala.  
 Martin, A. W., Haywood, W. Va.  
 Martin, Geo. L., Box 58, Balboa, C. Zone.  
 Maule, Wm. Henry, Inc., Philadelphia.  
 McArdle, Edward J., 106 W. 4th, Cincinnati, O.  
 McCormick, Jno., 663 Putnam Ave., Brooklyn, N. Y.  
 McDonough, F. L., Ft. Valley, Ga., care Southern Brokerage Co.  
 McDougal, Robert, 319 Postal Telegraph Bldg., Chicago, Ill.  
 McDougall, Wm., 919 43d St., Rock Island, Ill.  
 McGarvey, Dr. J. F., 754 Washington Ave., Lorain, Ohio.  
 McGrath, Lee, J., 132 Harmony St., Bridgeport, Conn.  
 McIlhenny, E. A., Avery Island, La.  
 Meeth, Louis H., 224 E. 22d St., Chester, Pa.  
 Merger, C. W., Ridgefield Park, N. J.  
 Meyer, Carl, 2144 Slane Ave., Norwood, Ohio.  
 Meyer, Ely, Box 888, Atlanta, Ga.  
 Meyer, E., R. 1, St. Louis Park, Minn.  
 Mida, L. W., Rand, McNally Bldg., Chicago.  
 Mill, J. C., 302 37th St., Milwaukee, Wis.  
 Mirchell, R. A., Marshall, Ill.  
 Mitchell, David, 168 Virginia Ave., Jersey City, N. J.  
 Moore, Dr. Geo. E., Ironwood, Michigan.  
 Morgan, M. V., Box 14, Weyercross, Ga.  
 Morrill, Dr. G. A., 167 Huntington Ave., Boston, Mass.  
 Moser, Jno., Santa Lucia Colony via Nuevitas, Cuba.  
 Mund, William, 1709 Vine St., Cincinnati, Ohio.  
 Myers, E. W., 1402 S. 17th St., St. Joseph, Mo.  
 Myers, Jacob P., 1002 Beulah Ave., Pueblo, Colo.  
 Newland, C. W., Pine Plains, N. Y.  
 Oberrender, Elliot A., 1503 Franklin Bank Bldg., Broad & Chestnut Sts., Philadelphia, Pa.  
 Otterman, Wm. A., 772 E. 92d St., Cleveland, O.  
 Package Sales Corporation, South Bend, Ind.  
 Parmely, Everett H., 48 S. Marshall St., Lancaster, Pa.  
 Patterson, L. D., Babcock, Ga.  
 Pence, Eugene, 942 Pine St., Oakland, Cal.  
 Perier, Joseph, 275½ Maple St., Holyoke, Mass.  
 Perfield, Thos. H., 58 W. 40th St., New York.  
 Pickworth, Jno. C. P., Gen. Del. Hillyard, Washington.  
 Pierce, Mrs. B. B., 820 Garrison Ave., Ft. Smith, Ark.  
 Pomeroy, Elweed, Donna, Texas.  
 Popenoe, Wilson, Bureau of Plant Industry, Washington, D. C.  
 Prouty, H. C., Route 4, West Brattleboro, Va.  
 Puffer, Luther W., Puffer Mfg. Co., Winchester, Mass.  
 Rebhun, Frank, 34 Vine St., Natrona, Pa.  
 Redfield, G. H., 410 Thorn St., Sewickley, Pa.  
 Regan, John J., 2405 Lake Isle Blvd, Minneapolis, Minn.  
 Regan, Wm. M., care Regan Bros. Co., Box 1777 Minneapolis, Minn.  
 Reynolds, David N., R. F. D. No. 2, Winston-Salem, N. C.  
 Reynolds, L., 2601 E. 15th St., Kansas City, Mo.  
 Robinson, T. R., Bureau of Plant Industry, Washington, D. C., temporary address Terra Ceia, Fla.  
 Rogers, Orra S., 217 Broadway, N. Y.  
 Romig, Dr. E. F., 1862 Beersford Rd., E. Cleveland, O.  
 Rowley, E. G., 6018 Morningside Drive, Kansas City.  
 Ruff, Dr., 145 Fuller Ave., S. E., Grand Rapids, Mich.  
 Rumsey, W. L., White Plains, N. Y.  
 Russell, D. G., Greybull, Wyo.  
 Sage, E. B., Red Rock, Pa.  
 Sample, H., Greybull, Wyo.  
 Schemek, V., 3014 Leamington Ave., Chicago.  
 Schillaber, C. F., National Mechanics & Traders Bank, Portsmouth, N. H.  
 Schindler, Geo., 320 S. Maple St., Centralia, Ill.  
 Schoenfeld, Wm. F., Box 1, New Haven, Ind.

- Schoolfield, D. G. C., 815 Quarrier St., Morrison Bldg., Charleston, W. Va.  
 Schrader, Mrs. G. A., 51 Wolcott Ave., Beacon, N. Y.  
 Schwiemann, H. C., Danvers, Ill.  
 Scott, A. S., 44 Hawthorne Ave., Crafton, Pa.  
 Seaton, Sara, 1943 E. 86th St., Cleveland, O.  
 Seminole Fruit Co., 908-9 Woodward Bldg., Washington, D. C.  
 Senn, L., 24 Stranton St., Woodhaven, N. Y.  
 Snannon, M. G., 3650 W. School St., Chicago, Ill.  
 Sherwin-Williams Co., 20 Glenn St., W., Atlanta, Ga.  
 Shider, Ira, 525 Bush St., Owosso, Mich.  
 Shultz, A. M., Shipman, Ill.  
 Simpson, Sam., 3550 Steele St., Denver, Col.  
 Skinner, Dr. A. M., Flemingsburg, Ky.  
 Smart, H. P., 1900 Irving Ave., S., Minneapolis, Minn.  
 Smiley, W. S., care Amer. Sheet & Tin Plate Co., Monessen, Pa.  
 Smith, H. W., Dragon, Utah.  
 Smith, H. W., 4623 Patterson Ave., Chicago.  
 Smith, James A., 572 W. 187th St., New York.  
 Sparks, O. B., 5102 First Ave., Birmingham, Ala.  
 Spreder, Thos. J., 847 63d Ave., West Allis, Wis.  
 Staebner, F. E., 2015 First St., N. W., Washington, D. C.  
 Stephens, Dr. Geo. E., Kenosha, Wisconsin.  
 Stevens, C. H., St. Johnsbury, Vt., winter address 334 6th Ave., N., St. Petersburg.  
 Stevens, T. E., care Potash Reductions Co., Omaha, Neb.  
 Stipe, Tobias, West Unity, Ohio.  
 Stone, G. W., 835 Dakin St., Chicago, Ill.  
 Styles, E., Leslie, Mich.  
 Sutcliffe, Joseph, 868 6th Ave., New York City.  
 Swan, J. C., McKinley, Isle of Pines, W. I.  
 Sweet, O. H., R. F. D. 2, Willamantic, Conn.  
 Thompson, Chas. S., 135 Eutaw St., E. Boston, Mass.  
 Thompson, Mrs. E., 36 Goodrich St., Long Island City, N. Y.  
 Thompson, J. F., 711½ Virginia St., Charleston, W. Va.  
 Tibbetts, Geo. W., Issaquah, Washington.  
 Townsend, G. Marot, River above Anderson, Hackensack, N. J.  
 Turner, Wm., 2241 Indiana Ave., Chicago.  
 Turton, Geo. L., 47 Brevort Place, Brooklyn, N. Y.  
 Underhill, Edward W., Syosset, Nassau Co., N. Y.  
 Upsall, Jno. W., Watseka, Ky.  
 Vanderbleek, S., 331 S. Mozark St., Chicago.  
 Vanderkloot, M. A., 200 N. Scoville, Ave., Oak Park, Ill.  
 Vezina, A. P., 28 Franklin St., Stamford, Conn.  
 Wakelin, Amos, Quinton, Salem Co., N. J.  
 Wakelin, Mrs. Amos, Quinton, Salem Co., N. J.  
 Walker, N. S. A., 508 N. Leamington Ave., Chicago, Ill.  
 Wallington, Jas., Saranac, Mich.  
 Wanock, Jas. 1419 Christian St., Philadelphia.  
 Warner, C. D., 433 Du Page St., Elgin, Ill.  
 Warner, W. H., 2689, East Overlook Rd., Euclid Hts., Cleveland, O.  
 Wheaton, W. J., 45 Hoyt Place, Rochester, N. Y.  
 Wheeler, H. J., 92 State St., Room 35, Boston.  
 Whipple, Herbert G., Kissimmee Fruit Co., 220 Broadway, N. Y.  
 Whitney, Chas. S., 3148 E. 80th St., Chicago, Ill.  
 Wieber, C. L. F., 408 Guardian Bldg., Cleveland, Ohio.  
 Wilson, Sylvester E., care Produce Reporter Co., State Lake Bldg, Chicago, Ill.  
 Willett, N. L., 849, Broad St., Augusta, Ga.  
 Williams, A. M., Asbury Park, N. J.  
 Williams, H. W., 1 Jacoby Place, Rockford, Ill.  
 Wing, Chauncey, Greenfield, Mass.  
 Witherber, B. B., 10th St., Norwich, Conn.  
 Withrow, J. M., 2943 Jule St., St. Joseph, Mo.  
 Woodbury, W. W., Sandwich, Ill.  
 Woodruff, C. T., Elizabeth, N. J.  
 Woodward, C. L., 1473 Pacific St., Brooklyn, N. Y.  
 Yeaton, W. S., Hempstead, N. Y.  
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 Zane, Lewis B., 925 Orchard St., Newport, Ky.

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Bartlett, Wright, Ft. Ogden.  
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Bexfield, Geo. F., Polk, Pa.  
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Birley, H. C., Box 208, Lake City.  
Bispham & McLaughlin, 902 Franklin St., Tampa.  
Black, F. H., Winter Haven.  
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Blake, Mrs. Ellis G., Lake Helen.  
Blakely, Wm. P., Ocoee.  
Blanton, E. P., Valrico.  
Blaze, Chas., Fruitland Park, Box 114.  
Bledsoe, B. B., Winter Park.  
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Boker, M. W., Sebring.  
Bolick, Amos., Ft. Myers.  
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Bonynge, E. W., Tangerine.  
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Bosanquet, Louis P., Fruitland.  
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Bostrom, J. A., Ormond Beach.  
Bosworth, N. C., Box 134, Fruitland.  
Bourlay, Frank H., Orlando.  
Bowden, Z. M., Plant City.  
Bowers, Chas. E., R. F. D. 2, Maitland.  
Bowers, R. T., Box 493, Gainesville.  
Bowers, T. L., Route 1, Box 26, Miami.  
Bowman, J. J., Box 1058, Orlando.  
Bowron, Rupert V., Eustis.  
Boyce, Dr. H. P., Box 485, Tampa.  
Boyd, E. M., Eagle Lake.  
Boyd, Mrs. E. M., Eagle Lake.  
Boyd, H. J., Clermont.  
Boyd, J. H., Clermont.  
Boyd, W. Lacy, Bartow.  
Boyer, James, Avon Park.  
Boysen, L. L., 252 E. Chase St., Pensacola.  
Bradbury, C. O., Winter Haven.  
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Brannock, Mrs. Geo. P., Daytona.  
Brannon, T. C., Orlando.  
Bray, J. W. F., Box 144, Winter Garden.  
Bridge, Edgar, Sebring.  
Briggs, W. R., Bradentown.  
Brigham, F. E., Florence Villa.  
Brigham, Dr. H. C., Miami.  
Bright, Jas. H., Miami.  
Brinson, M. M., Rock Harbor.  
Brokaw, W. H., Orlando.  
Brooks, Chas. D., 907 Ave. C, Miami.  
Brower, J. K., Green Cove Springs.  
Brown, A. C., State Plant Board, Gainesville.  
Brown, A. H., Manatee.  
Brown, A. V., West Palm Beach.  
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 Brown, Mrs. Vet. L., Bartow.  
 Browne, C. E., Lucerne Park.  
 Bruce, G. Duncan, Winter Haven.  
 Bruen, Geo. H., Georgiana.  
 Bruyiere, J., Box 123, Avon Park.  
 Bryan, E. J., Ocala.  
 Bryan, R. L., Bartow.  
 Bryan, W. E., Bellaire.  
 Buchholz, L. W., Gainesville.  
 Bullock, Mrs. Mildred W., Sutherland.  
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 Buttler, Howard V., Lake Alfred.  
 Buttler, Mrs. Howard V., Lake Alfred.  
 Bryan, E. J., Ocala.  
 Byrd, R. L., P. O. Box 28, Winter Garden.  
 Byron, E. S., Crooked Lake.  
 Bystra, Henry G., Dunnellon.  
 Cadman, W. H. R., Orlando.  
 Caldwell, Halsted W., Winter Park.  
 Caldwell, S. W., Lake Wales.  
 Cameron, A. N., Weirsdale.  
 Cameron, D. F., Leesburg.  
 Cameron, John M., Ft. Myers.  
 Campbell, Allen E., Melbourne.  
 Campbell, J. O., Box D, Melbourne.  
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 Carmen Grape Co., Oldsmar.  
 Carn, W. D., Ocala.  
 Carnes, W. W., Lock Box O, Bradentown.  
 Carroll, S. J., Lotus.  
 Carroll, R. R., Ocala.  
 Carris, R. T., Orlando.  
 Cartmel, Frank, care of E. Bean & Son, Jacksonville.  
 Carter, Jasper C., Dade City.  
 Carter, W. T., 320 13th St., Miami.  
 Carton, Harold W., Haines City.  
 Casson, A. C., New Port Richey.  
 Caruthers, J. M., Orlando.  
 Castillo, Tony, 1208 Arch St., West Tampa.  
 Castle, A. C., Perrine.  
 Catrow, L. L., Sebring.  
 Causey, J. H., Wauchula.  
 Central Fla. Real Estate & Investment Co., W. A. Libby, Pres., Box 1101, Orlando.  
 Chace, J. E., Ocala.  
 Chadwick Bros., Punta Gorda.  
 Chaffin, Jeff, Gainesville.  
 Chamberlain, E. W., Tangerine.  
 Champneys, W. T., Apopka.  
 Chapman, Mrs. A. F. J., Box B, Port Orange.  
 Chapman, W. A., Box 46, Apopka.  
 Chase, S. O., Box 31, Sanford.  
 Chas. Deering Properties, Buena Vista.  
 Chamberlayne, John Hampden, Hereford Grove, Orlando.  
 Chamberlayne, Mrs. John Hampden, Hereford Grove, Orlando.  
 Chillingworth, C. C., West Palm Beach.  
 Christ, Dr. C. D., Orlando.  
 Christiance, D. F. F., Coconut Grove.  
 Christie, Ronald, Box 76, Sorrento.  
 Clark, Harvey, Ocala.  
 Clark, Dr. J. D., West Palm Beach.  
 Clark, Louis S., Palm Beach.  
 Clark, Sydney, R. A., Miami.  
 Clarke, Louis S., Palm Beach.  
 Clayton, H. G., Gainesville.  
 Clezal, L. H., Ocala.  
 Cline, A. E., Altamonte Springs.  
 Cline, Elmer E., Auburndale.  
 Coan, R. C., Keystone Park.  
 Cobb, Arthur, Ocala.  
 Coe, M. B., 225, 4th St., St. Petersburg.  
 Codwise, C. W., Bonita Springs.  
 Cody, J. W., Vero.  
 Coffin, C. E., Winter Park.  
 Coggins, H. A., Orlando.  
 Cogswell, N. M., Box 1076, Orlando.  
 Coit, D. G., P. O. Box 76, Jacksonville.  
 Coles, C. H. & Son, Gainesville.  
 Coleman, Geo. D., Lisbon.  
 Cook, G. W., 303 E. Montgomery St., Creston.  
 Collier, Fred, Sebring.  
 Collins, Paul, Orlando.  
 Coolidge, J. W., Ft. Pierce.  
 Coon, Wm. R., 419 S Fifth Ave., St. Petersburg.  
 Conant, E. E., Bartow.  
 Condry, P. W., Coconut Grove.  
 Conkling, R. A., West Palm Beach.  
 Conner, D. S., R. F. D. 1, Homestead.  
 Conner, H. C., Bartow.  
 Conner, Floy, Bartow.  
 Constantine, Harry H. Jr., R. F. D. Box 117, Clearwater.  
 Constatine, John, R. F. D. 2, Palmetto.  
 Conway, T. V., Sebring.  
 Cornell, Dr. H. M., Orlando.  
 Cosmer, F. D., Box 486, Dade City.  
 Cotton, Richard T., Box 259, Orlando.  
 Coup, Albert A., Box 209, Punta Gorda.  
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 Crabb, R. R., Leesburg.  
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Cunne, J. H., San Antonio.  
Curry, Mrs. A. P., 416 E. Church St., Orlando.  
Curry, Geo. G., West Palm Beach.  
Cushman, Lucy C., Tallahassee.

Dade, L. T., Ft. Pierce.  
Dade, R. H. F., Orlando.  
Daetwyler, M. J., Orlando.  
Dahm, E. M., Haines City.  
Dalameter, P. A., Winter Haven.  
Danielson, D. G., Box 373, Miami.  
Davenport, W. S., Winter Haven.  
Davis, J. W., Ocala.  
Davis, W. C., Winter Haven.  
Davis, W. M., Orlando.  
Davis, W. W., 21st Ave., St. Petersburg.  
Day Theodore H., Grand Island, Lake Co., Fla.  
Deal, J. C., Oak Hill.  
De Beule, Dr. Reni B. J. M., Lutz.  
DeBusk, E. F., Gainesville.  
DeHon, Russell, Ocala.  
Delano, John I., Palm City.  
Denison, W. A., Winter Haven.  
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Derby, A. S., Rockledge.  
Dickerman, Mrs. Elford, Mt. Dora.  
Dickinson, Alfred, Bonita Springs.  
Dickinson, C. P., Orlando.  
Dieffenderfer, J. G., Winter Park.  
Dillingham, H. J., Largo.  
Dimberline, Sam'l, Box 180, Sebring.  
Ditto, Frank, Ocala.  
Dixon, LeRue, Cocoa.  
Dodd, Roger, Ocala.  
Doel, Geo. H., Box 506, St. Cloud.  
Donelly, Thos., Indianola.  
Donnelly, Mrs. C. G., Palm Beach.  
Donnelly, J. B., Palm Beach.  
Dopson, Walter A., Sanderson.  
Doran, A. H., Gainesville.  
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Eikenberry, L. A., Sebring.  
Eiland, John, Sebring.  
Elder, J. S., Yalaha.  
Elliot, H. H., P. O. Box 1442, Miami.  
Ellis, Geo. R., Gainesville.  
Ellis, Miss Louise, Gainesville.  
Ellis, Richard A., Box 447, Tampa.  
Ellis, T. B., Gainesville.  
Elvinson, Sylvester, Orlando.  
Emerson, C. S., care Times-Union, Jacksonville.  
Emerson, Geo. D., Cocanut Grove.  
English, Alex, Winter Park.  
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Evans, Marthana, Winter Haven.  
Evans, R. E. L., Monticello.  
Evans, William E., Eustis.  
Everett, Robt., Box 31, Marco.  
Ewers, R. F., Sebring.  
Ewing, Kennedy E., Route 2. Box 36, Bartow.  
Fairchild, H. E., Crooked Lake.  
Farley, J. F., Malabar.  
Farnback, J. A., Boardman.  
Fattig, P. W., Gainesville.  
Ferreira, J. E., 702 W. Church St., Orlando.  
Ferran, H. O., Eustis.  
Fish, Bert, DeLand.  
Fishback, D. E., Orlando.  
Flemings, H., Kissimmee.  
Flemming, Sam T., Gainesville.  
Fletcher, F. W., Orlando.  
Florida Grower Publishing Co., Tampa.  
Florida National Bank of Gainesville, Gainesville.  
Floyd, Bayard F., Orlando.  
Floyd, Mrs. Bayard F., Orlando.  
Floyd, C. V., R. R. 1, Miami.  
Floyd, W. L., Gainesville.  
Fluke, T. J., New Port Richey.  
Fogg, Harry W., Leesburg.  
Forbes, Edw., Ritta.  
Forbes, Donald, Orchid.  
Foster & Foster Inc., West Palm Beach.  
Foster, E. A., R. 1, Box 19, Orlando.  
Fowler, H. E., Winter Garden.  
Francisco, W. M., Leesburg.  
Frank, Chas. P., Ft. Myers.



- Frazier, Branson, Titusville.  
 Freeman, Jesse W., Largo.  
 Freeman, W. D., Winter Park.  
 Freer, W. F., Ocala.  
 Fritch, E. D., Earman.  
 Fuchs, Fritz, 230 1st St., Miami.  
  
 Gable, P. K., Merritt.  
 Gaines, Geo. T., Pensén.  
 Gainesville Furniture Co., Gainesville.  
 Gainesville Sun, Gainesville.  
 Gamewell, O. H., Box 348, Vero.  
 Gardner, F. C., Lake Alfred.  
 Gardner, Mrs. F. C., Lake Alfred.  
 Gardner, J. H., Vero.  
 Garrard, Dr. J. A., Bartow.  
 Garst, Dr. J. H., Sebring.  
 Garrett, Chas. A., Route 1, Box 34, Kissimmee.  
 Garrett, L., R. No. 1, Orlando.  
 Garvey Bros., Ft. Myers.  
 Gary, W. T., Ocala.  
 Gary, Mrs. W. T., Ocala.  
 Geier, Wm. G., Windermere.  
 Geier, Mrs. Wm. G., Windermere.  
 Gentile, Lawrence, Orlando.  
 Gerig, A. E., Ocala.  
 Gibson, A. P., Clermont.  
 Gibson, Nelson, Citrus.  
 Gilbert, A. R., Bradentown.  
 Gilbert, Dr. Elsie M., Jackson St. and Central Ave., Tampa.  
 Giles, A. G., Terra Ceia.  
 Giles, J. L., Orlando.  
 Gill, P. C., Marvel.  
 Gillingham, A. H., Ft. Myers.  
 Gilman, V. C., Crooked Lake.  
 Gist, J. V., Gainesville.  
 Gist, W. M., McIntosh.  
 Glass, Rev. J. G., Orlando.  
 Glazer, George, Oneco.  
 Goldberg, E. R., R. F. D., Homestead.  
 Gomme, Wm., Bartow.  
 Goodrich, Chas., St. Cloud.  
 Goodwin, R. L., Ft. Pierce.  
 Gore, Mrs. M., 211 Lucerne Circle, Orlando.  
 Grabel, R. E., Orlando.  
 Graham, Benj., Sparr, R. F. D., Citra.  
 Graham, John E., Sebring.  
 Graham, John W., 617 Biscayne Bay Ave., Miami.  
 Graham & Shriver Co., Ft. Myers.  
 Grant, A. J., Dunedin.  
 Grantham, Benj., Sparr.  
 Graw, A. C., Homestead.  
 Greynolds & Monroe Realty Co., West Palm Beach.  
 Grey, Julian, R. R. 1, Orlando.  
 Griggs, H. L., Oak.  
 Griffin, S. S., Orlando.  
 Griffing & Co., C. M., Macclenny.  
 Griffing, W. D., Umatilla.  
 Griffis, J. W., Oak Hill.  
  
 Groover, F. C., Box 1090 A., Jacksonville.  
 Grosse, O. R., Mgr. Nevins Groves, Merritt.  
 Grossenbacher, J. G., Apopka.  
 Gulf Fertilizer Co., Citizens Bank Bldg., Tampa.  
 Guller, Mrs. C. E., Stuart.  
 Gumprecht, H. G., Bradentown.  
 Gurney, L. H., Merritt.  
 Gustafson, E. G., Ft. Pierce.  
  
 Haines, E. T., Altamonte Springs.  
 Haines, Cong. C. D., Altamonte Springs.  
 Hall, E. T., R. F. D. H, Homestead.  
 Hale, C. P., Crescent City.  
 Hale, G. S., Oakland.  
 Hall, C. E., Boynton.  
 Hall, J. E., Box 351, Ft. Myers.  
 Hall, James, Ocala.  
 Hall, W. Harvey, Yalaha.  
 Hall, Wm. H., Box 147, Melbourne.  
 Hallam, W. F. & Co., Lakeland.  
 Hamburg, A. B., Lake Wales.  
 Hamilton, D. E., Box 33, Dunedin.  
 Hamlin, Arthur G., Box 89, DeLand.  
 Hamm, H. O., Box 111, Palatka.  
 Hamm, W. T., Box 111, Palatka.  
 Hammer, B. L., Valrico.  
 Hampton, B. F., Gainesville.  
 Hampton, B. M., New Port Richey.  
 Hampton, W. W., Gainesville.  
 Hancock, J. C., Box 924, Miami.  
 Hanna, J. C., Lutz.  
 Hanson, H. L., Prosper, N. D., winter address Miami.  
 Harbrecht, L. C., Jensen.  
 Hardee, W. R., R. F. D. No. 1, Ft. Pierce.  
 Harding, E. E., Balm.  
 Harper, A. K., St. Petersburg.  
 Harold, A. R., R. F. D. A, Box 101, Miami.  
 Harrington, C. W., Winter Haven.  
 Harrington, Mrs. C. W., Winter Haven.  
 Harrington, E. W., Winter Haven.  
 Harris, F. E., Lake Worth.  
 Harris, W. J., DeLand.  
 Harris, J. T., Valrico.  
 Harriess, W. W., Ocala.  
 Harshman, E. W., Sebring.  
 Hartman, D. L., Little River.  
 Hartman, John H., Palm City.  
 Haskins, Earle L., Winter Park.  
 Hasson, Harry, care of Armour Fertilizer Wks., Jacksonville.  
 Hatton, T. T., Bartow.  
 Hawkins, H. S., Largo.  
 Haynes, A. C., DeLand.  
 Hazen, H. E., Box 49, R. F. D. 1, DeLand.  
 Heck, Joy, R. F. D. No. 1, Miami.  
 Heimbürger, L., 2306 Nebraska Ave., Tampa.  
 Heitman, H. E., Ft. Myers.  
 Helms, J. T. Jr., Valrico.  
 Helseth, C. E., Indrio.  
 Henderson, Rufus C., Largo.

- Henry, Dr. Hugh, Ocala.  
Hentz, Mrs. W. B., Winter Haven.  
Herbst, Emil, R. F. D., Ft. Pierce.  
Herlong, Z. C., Micanopy.  
Hewitt, P. A., Bradentown.  
Hewke, T. S., "Golden Knoll," Winter Park.  
Heyward, J. F., 210 Grand Central, Tampa.  
Hileman, Mrs. W. J., 504 E. Rose St., Lakeland.  
Higney, W. M., Dunedin.  
Hill, Arthur J. R., Box 152 San Antonio.  
Hill, W. R., Winter Haven.  
Hinsky, Jno. B., care The Pines Hotel, Daytona.  
Hocker, F. R., Ocala.  
Holmes, Henry, Monticello.  
Holworthy, A. J., Lakeland.  
Hood, J. W., Ocala.  
Hosford, Ed. L., Sewall's Point.  
Hoskins, Thos., Orlando.  
House, Dr. O. W., 424 Central Ave., St. Petersburg.  
Howell, D., Henderson, Vero.  
Howell, Edward B., Arlo Box Co., Oak.  
Howell, J. L., Dunedin.  
Hoyt, Agnes D., Hoyt Groves, R. F. D., Clearwater.  
Hoyt, W. B., Oldsmar.  
Hubbard, Mrs. E. S., Federal Point.  
Hubbell, Walcott W., Palmetto.  
Hughes, W. D., Box 305, Miami.  
Humbarger, John, Felsmere.  
Hume, E. G., Glen St. Mary.  
Hume, H. H., Glen St. Mary.  
Hume, Mrs. H. Harold, Glen St. Mary.  
Humphreys, A. S., Indianola.  
Hunt, Chas. M., Lake Wales.  
Hupple, Grover, Orlando.  
Hutches, M. D., 17 E. Concord Ave., Orlando.  
Hutchins, J. B., Box 4, Altamonte Springs.  
Hurd, Jay C., Alva.  
Hurlburt, Thos. H., Orlando.  
  
Ingham, H. D., Lake Wales.  
Ingraham, J. E., St. Augustine.  
Irey, Julian, R. R. 1, Orlando.  
Israelson, Max, Ocala.  
Ittner, Geo., St. Petersburg.  
  
Jackson, Arthur, Shiloh.  
Jackson, G. D., Eustis.  
Jacocks, A. J., Okahumpka.  
James, Geo., 303 Engman St., Clearwater.  
Janes, F. G., Wauchula.  
Javens, M. Marcellus, Mt. Dora.  
Jeager, Gideon, Sebring.  
Jeal, Geo., Box 278, Crescent City.  
Jefferies, Jno. H., Largo.  
Jenkins, L. M., Sebring.  
Jennings, C. B., Box 344, Ft. Myers.  
Jensen, Carl M., Box 180, Boynton.  
Jernigan, W. P., Monticello.  
  
Johnson, A., Candler.  
Johnson, August P., Boynton.  
Johnson, Chris., Marco.  
Johnson, L. E., care Bank of Clearwater, Clearwater.  
Johnson, I. M., Box 206, Winter Haven.  
Johnson, J. Lee, Sebring.  
Johnson, J. W., Jensen.  
Johnson, M. T., Avon Park.  
Johnson, O. F., Piedmont.  
Johnson, S., Orlando.  
Jones Bros., Sebring.  
Jones, J. C., Vero.  
Jones, J. W., Winter Garden.  
Jordan, F. R., Eau Gallie.  
Judy, G. W., 859, Riverside Ave., Jacksonville.  
  
Karst, E., Orlando.  
Kaufmann, E. J., Lakeland.  
Kay, A. O., Ft. Pierce.  
Keck, Irving, Bowling Green.  
Kelly, Emory L., R. D. No. 1, Homestead.  
Kelly, G. H., Gainesville.  
Kelund, G. E., 325 Datura St., West Palm Beach.  
Kern, John F., Jupiter.  
Kimball, J. S., P. O. Box W, Mt. Dora.  
Kimbrell, W. R., Oviedo.  
Kimbrow, B. N., Jacksonville.  
Kime, Chas. D., Orlando.  
King, Geo. J., Okahumpka.  
King, William, Avon Park.  
King, W. A., Panasoffkee.  
Kingsley, Geo., Altamonte Springs.  
Kirkland, L. P., Winter Haven.  
Klock, Dr. J. E., Eastlake.  
Klemm, Arthur R., Winter Haven.  
Klemm, Mrs. Arthur R., Winter Haven.  
Klemm, A. Richard, Winter Haven.  
Knight, Joe, Elfers.  
Knight, Robert A., Box 106, Pensacola.  
Knight, R. J., Safety Harbor.  
Knight, Mrs. R. J., Safety Harbor.  
Knight & Wall Co., Box 98, Tampa.  
Knox, L. B., Bulow.  
Knull, Wm. H., Knull Floral Co., Tampe.  
Kreamer, Harry M., Fort Myers.  
Krouse, Henry, Sebring.  
Kuebler, F. A., Oak Hill.  
  
Lafon, N., Paisley.  
Lainhart, G. W., West Palm Beach.  
Laird, A. L., Sebring.  
Lake Garfield Nurseries Co., Bartow.  
Lamons, D. H., Box 634, Ft. Myers.  
Landstreet, Arthur F., Box 1082, Orlando.  
Lanier, Virgil A., Box 1202, Jacksonville.  
Lanphear, O. C., Lakeland.  
Larry, Dock, Thonotosassa.  
Larson, L. M., Piedmont.  
Larsson, Jonas, Piedmont.

- Lathers, Chas. F., Winter Park.  
 Lauback, P. F., Orlando.  
 Laughlin, Mrs. James 3d, Orlando.  
 Lawrence, Dr. E. J., Windermere.  
 Lawrence, Mrs. E. J., Windermere.  
 Layton, Miss H., Tallahassee.  
 Lazonby, J. Lionel, Largo.  
 Leach, Robt., Seminole.  
 Leavengood, P. V., Ocala.  
 Lee, Thomas G., Box 515, Orlando.  
 Lee, William Justice, Box 378, Jacksonville.  
 Leffler, Peter, Vero.  
 Lenfest, R. E., Winter Park.  
 Leiphart, Jas. A., Sebring.  
 Lenhart, R. A., Box 2322, Tampa.  
 Lent, Victor, Sorrento.  
 Lewis, Jno. T. & Sons, Ocklawaha.  
 Light, C. M., Route 5, Box 125, Tampa.  
 Lindner, Chas. A., Box 38, R. F. D., Homestead.  
 Lindner, Ross W., Largo.  
 Lindsey, A. M., Ormond Beach.  
 Liles, A. G., Terra, Ceia.  
 Link, W. R., Orlando.  
 Lipscomb, S. F., Bartow.  
 Lipsey, H. D., Box 842, Miami.  
 Lipsey, L. W., Blanton.  
 List, Mrs. L. B. C., Winter Park.  
 Livermore, T. L., Bee Ridge.  
 Logan, F. H., Oak.  
 Long, G. R., Lockhart.  
 Long, Silas, Vero.  
 Lord, Charles, Orlando.  
 Lott, Dr. E. W., Box 486, Orlando.  
 Loveland, Clifton W., Satsuma Heights.  
 Lowe, John, 11 Summerfield St., Orlando.  
 Lowry, Miss Irene B., 110 W Duval St., Live Oak,  
 winter address Lock Box 186, Miami.  
 Luckert, Wm., Salerno.  
 Lundberg, Ed. D., care Standard Growers Ex-  
 change, Orlando.  
 Lyman, H. C., Altamonte Springs.  
 Lyman, H. I., P. O. Box 956, Orlando.  
 Lyman, W. I., Box 956, Orlando.  
 Lyons, Chas. W., Tampa.  
 Lytle, Dr. Earl B., Weirsdale.  
  
 MacDonald, E. S., Palma Sola.  
 MacDonald, Hugh, Ft. Myers.  
 MacKay, Geo., Ocala.  
 Mace, J. P., Lake Helen.  
 Magoon, C. H., 327 Margaret St., Key West.  
 Male, James S., Route 1, Box 13, Manatee.  
 Mallett, C. M., Orlando.  
 Manatee, Hamock Fruit Co., Box 393, Manatee.  
 Mann, W. W. & Son Co., Winter Haven.  
 Mansfield, O. L., Sebring.  
 Mapp, Edward, Stuart.  
 Markle, Geo. W., Winter Haven.  
 Markley, R. T., Clearwater.  
 Marsh, Geo. S. Jr., 502 E. Washington St., Or-  
 lando.  
 Marsh, J. F., Ocala.  
 Martin, A. O., Apopka.  
 Martin, C. C., 802 Platt St., Tampa.  
 Martin, E. H., Ocala.  
 Martin, Geo., Drawer B, Sebastian.  
 Martin, R. L., Room 14 Merchants Bldg., Ocala.  
 Martin, S. H., Arlo Box Co., Oak.  
 Martin, W. E., Orlando.  
 Martin, William John, Orange City.  
 Masters, W. G., Ft. Myers.  
 Mathis, W. B., Glen St. Mary.  
 Matheson, H. M., Coconut Grove.  
 Matthews, W. R., Leesburg.  
 Maurer, A. Phil, Orlando.  
 Mayo, Nathan, Summerfield.  
 Mays, E. D., 204 W. Bay St., Jacksonville.  
 McAteer, J. S., Ocala.  
 McCabe, P., Box 95, San Antonio.  
 McCall, W. W., Lake Alfred.  
 McClanahan, S. L., Sebring.  
 McClave, W. S., Box 1038, Miami.  
 McClurg, J. G., Sebring.  
 McCollum & Co., J. W., Gainesville.  
 McConnell, Thomas H., Orlando.  
 McCord F. E., Palm City.  
 McCulloch, John, Maitland.  
 McCullum, Ross A., R. F. D. No. 1, Winter Park.  
 McDonald, Alex., Leesburg.  
 McDonald, Alex. Jr., Leesburg.  
 McElroy, Dr. Sylvan, Orlando.  
 McElroy, Dr. J. N., Orlando.  
 McGauhy, Dr. H. G., Orlando.  
 McGehee, W. J., Ocala.  
 McGregar, C. D., Winter Haven.  
 McGuire, R. F., Orlando.  
 McGuire, W. A., Ocala.  
 McKay, Herbert C., Box 606, Umatilla.  
 McLendon, H. S., St. Augustine.  
 McLendon, R. W., Miami.  
 McMurry, Dr. Robt. J., Sebring.  
 McQuarrie, C. K., Gainesville.  
 McRory, H. W., Monticello.  
 Mead, Theodore L., Oviedo.  
 Melton, William, West Palm Beach.  
 Melvin, D. M., Winter Haven.  
 Mendell, Mrs. M. R., Hawks Park.  
 Menzel, Wm., Boynton.  
 Meres, Amelia P., Tarpon Springs.  
 Merrell, Herman, St. Petersburg.  
 Merrin, Frank, Dade City.  
 Mershon, W. E., Leesburg.  
 Michaels, A. B., Wabasso.  
 Midgett, T. O., Crescent City.  
 Miles, Arthur J., New Port Richey.  
 Miles, Franklin, Fort Myers.  
 Mill, John P., Leesburg.  
 Mills, Mrs. Mary P., Box 86, Plant City.  
 Miller, Chas. A., P. O. Drawer No. 58, DeLand.  
 Miller, C. H., Box 100, Goulds.  
 Miller, Geo. A., P. O. Box 352, New Augustine.  
 Miller, Harry E., Winter Haven.



- Miller, J. C., Haines City.  
 Miller, J. W., Box 88, Leesburg.  
 Miller, M. M., Sebastian.  
 Miller, Phillip, Gainesville.  
 Miller, P. G., Sebring.  
 Miller, W. F., Varico.  
 Mills, Dr. J. H., 503 Citizens Bank Bldg., Tampa.  
 Minor, T. J., Ocoee.  
 Mitchell, J. F., Box M, Titusville.  
 Montgomery, Dr. J. H., Gainesville.  
 Moore, Chas. W., Box 65, Punta Gorda.  
 Moore, H. E., Haines City.  
 Moore, John L., Haines City.  
 Moore, J. Lawrence, Box 127 D, R. F. D. No. 1, Tampa.  
 Moorehead, Caroline, Ocala.  
 Morehead, Chas. D., Box 104, New Port Richey.  
 Moreman, M. S., Switzerland.  
 Morgan, E. H., Fort Ogdén.  
 Morgan, Jessie T., 187 R. F. D., Lakeview Ave., St. Petersburg.  
 Morley, J. N., Lake Alfred.  
 Morrison, S. S., Windermere.  
 Morton, Mrs. Caroline L., Box 704, Orlando.  
 Morton, Mrs. Gertrude P., Box 704, Orlando.  
 Moss, F. E., Lakeland.  
 Motter, E. S., Lake Worth.  
 Moznette, G. F., Box 1134, Miami.  
 Mowry, Harold, Box 1713, Jacksonville.  
 Muir, Wm., 1724 Beach Drive, St. Petersburg.  
 Murphy, Chas. R., Arlo Box Co., Oak.  
 Murray, L. M., Ocala.  
 Muster, F. L., Boynton.  
 Naberhuis, H. A., Sta. 3, Miami.  
 Nanney, W. C., Lake Wales.  
 Nehrling, W. F., Orlando.  
 Neighbor, John J., Ocala.  
 Newell, Wilmon, Gainesville.  
 Nicherson, R. W., Box 120, West Palm Beach.  
 Nichols, A. C., R. F. D., Clearwater.  
 Nille, L., Orlando.  
 Nocatee Crate Co., Nocatee.  
 Nolan, Geo. E., Orlando.  
 Noll & Noll, Sanford.  
 Nordmann, Fred, New Smyrna.  
 Norman, R. E., Port Tampa City.  
 Norris, F. H., Box 105, Ormond Beach.  
 Nutt, W. E., Sutherland.  
 Nyman, J. A., Sharpes.  
 Oakes, Orin B., Winter Haven.  
 Oberrender, H. S., Homestead.  
 O'Byrne, F. M., Gainesville.  
 Ocala Manufacturing Co., Ocala.  
 Oglesby, Ren., Bartow.  
 O'Hara, A. B., Rockledge.  
 Ohlinger, D. B., Haines City.  
 Ohlinger, O. H., Haines City.  
 O'Kelly, E. B., 18 Jefferson St., Jacksonville.  
 Oliphant, Ross G., Oneco.  
 Olson, Olle D., Flight B, Carlstrom Field, Arcadia.  
 O'Neal, W. R., Box 1037 Orlando.  
 Opitz, E. W., Owanita.  
 Orchard, Paul W., St. Augustine.  
 Olds, Orida Miss., Exec. M. J. Olds, Marco.  
 Orr, Grant, Arcadia.  
 Osborn, E. W., Box 32, Lakeland.  
 Osteen, J. W., Altamonte Springs.  
 Ott, John, Vero.  
 Overocker, W. H., Frostproof.  
 Overstreet, M. O., Orlando.  
 Palmer, J. C., Windermere.  
 Palmer, W. M., Ocala.  
 Park, Geo. M., Dunedin.  
 Parker, A. E., Boynton.  
 Partridge, Miss S., Tallahassee.  
 Pasteur, G. C., Ocala.  
 Patchin, Ray C., Mims.  
 Pattillo, A. T., DeLand.  
 Pattern, Marcellus A., S. Florida Ave., Lakeland.  
 Pattillo, C. T., Oak Hill.  
 Patton, B. A., Loughman.  
 Peacon, Richard, care of Jno. Carey, Jew Fish.  
 Pearce, Eugene L., Clearwater.  
 Pennock, Herbert A., Jupiter, Box 118.  
 Penrifo, C. A., Grand Island.  
 Pepper Printing Co., Gainesville.  
 Perrin, R. G., Box 818, Winter Haven.  
 Peterkin, G. W., Lakeland.  
 Phifer State Bank, Gainesville.  
 Phillips, Geo. W., Orlando.  
 Phillips, Dr. P., Orlando.  
 Philpot, R. O., Haines City.  
 Pierson, M. G., 215 E. Robinson, Orlando.  
 Picard, W. M., Sebring.  
 Pinkney, Samuel, Apopka.  
 Pitmon, R. G. & Co., Apopka.  
 Pixton, J. W., Iona, Lee Co.  
 Player, Harry, Box 752, Tampa.  
 Pollard, Marion, Sebring.  
 Poole, E. P., Vero.  
 Poole, S. F., Winter Haven.  
 Poole, Wm. H., care Armour Fert. Wks., Jacksonville.  
 Porcher, S. G., Cocoa.  
 Potter, Morris W., Bonita Springs.  
 Potter, R. D., Tampa.  
 Prang, F. C., Vero.  
 Pressler, Charlotte E., Orlando.  
 Preston, Miss Moselle, Bartow.  
 Preston, Walter L., 1001 Citizens Bank Bldg, Tampa.  
 Price, A. F., Dade City.  
 Price, Roy M., Box 456, West Palm Beach.  
 Pritchett, H. E., Lakeland.  
 Provost, Chas. D., Georgiana.  
 Pruden, Alfred J., Winter Haven.  
 Pruitt, A. J., Lakeland.

- Raab, A. G., R. F. D. Box 181, Homestead.  
 Rabama Fruit Co., Orlando.  
 Raden, G. T., Winter Haven.  
 Rahn, Wm. J., Haines City.  
 Rainey, J. L., Miami.  
 Ralls, Mrs. Ada O, Keuka.  
 Randall, F. A., Haines City.  
 Randolph, R. F., P. O. Box 505, Clearwater.  
 Rane, F. W., care Kelsey Development Co., West Palm Beach.  
 Ray, Alexander, City Hall, Jacksonville.  
 Raymond, T. W., Holly Springs.  
 Raymond, W. W., Owanita.  
 Reasoner, E. N., Oneco.  
 Reasoner, Norman A., Oneco.  
 Redditt, J. B., Ft. Christmas.  
 Redfield, L. A., Auburndale.  
 Reinsch, Bruno, R. F. D. No. 1, Ft. Lauderdale.  
 Reynolds, A. K., St. Petersburg.  
 Reynolds, M. L., Ocala.  
 Rhodes, L. M., 417 St. James Bldg., Jacksonville.  
 Rhudy, J. H., Gainesville.  
 Rice, Everett S., Sebring.  
 Richardson, H. J., Exchange Supply Co., Tampa.  
 Richardson, L. C., Route B, Miami.  
 Richmond, L. C., Route B., Miami.  
 Ricker, R. C., Bradetown.  
 Ringdahl, Gus, White City.  
 Ringhausen, Edward, Route 1, Box 16, Orlando.  
 Rippberger, P. J., Sebring.  
 Rivinius, C., Oneco.  
 Roberts, A., Dade City.  
 Roberts, Norton, Box 211, Tampa.  
 Robertson, A. H., Route B, Lakeland.  
 Robertson, D. W., A. A. C. Co., Jacksonville.  
 Robertson, Paul F., R. F. D. B, Lakeland.  
 Robinson, G. A., Lake Wales.  
 Robinson Willard H., Box 137, Lake Helen.  
 Rogers, A. W., Box 853, St. Petersburg.  
 Rogers, R. S., Ocala.  
 Roper, Roy R., Winter Garden.  
 Rose, C. G., Ocala.  
 Rose, R. E., Tallahassee.  
 Rose, Mrs. R. E., Tallahassee.  
 Rose, W. W., Orlando.  
 Ross, Dr. J. H., Winter Haven.  
 Ross, Mrs. J. H., Winter Haven.  
 Rou, S. F., Lowell.  
 Roundtree, E. W., Punta Gorda.  
 Routhorne, Joseph, Sebring.  
 Royal Fern Co., Altamonte Springs.  
 Royer, Wm., 822 Eighth St., Miami.  
 Ruhl, P. A., Sebring.  
 Ruprecht, R. W., Gainesville.  
 Rumpfelt, Geo. H., Oak Hill.  
 Sadler, J. H., Oakland.  
 Sadler, Dr. O. W., Mt. Dora.  
 Safford, Mary A., Orlando.  
 Sample, A. M., Ft. Pierce.  
 Sample, J. R., Haines City.  
 Sample, M., Haines City.  
 Sampson, F. G., Boardman.  
 Sampson, Mrs. F. G., Boardman.  
 Sawyer, R. J., Bee Ridge.  
 Saxton, E. E., Route 6, Lakeland.  
 Schabinger, J. J., Box 472, Delray.  
 Schermerhorn, Chas. F., Oak Knoll.  
 Schmidt, Dr. E. E., Blanton.  
 Schnabel, John, Glen St. Mary.  
 Schnarr & Co., J., Orlando.  
 Schober, Dr. W. B., Cocoanut Grove.  
 Schreiber, F. G., Ocala.  
 Schroeder, Erich, Box 175, Jensen.  
 Schubert, W. J., care Armour Fert. Wks., Jacksonville.  
 Schultz, W. H., Winter Haven.  
 Schumacher, E., Sharpes.  
 Schumacher, Henry E., R. F. D. 1, Homestead.  
 Schumard, R. C., Sebring.  
 Scott, G. S., Ocala.  
 Scott, J. B., Winter Haven.  
 Scott, L. W., R. R. 1, Tallahassee.  
 Scott, Walter, R. R. Box 96, Bartow.  
 Sebring, Geo. E., Sebring.  
 Sebring, H. O., Sebring.  
 Seminole Seed Co., Gainesville.  
 Seng, W. J., Leesburg.  
 Sessions, D. L., Box 991, Orlando.  
 Sessions, W. A., Ocala.  
 Sexton, W. E., Vero.  
 Shaw, Miss Eleanor, Mt. Dora.  
 Shaw, W. P., R. R. B, Box 92, Dade City.  
 Shooter, C. C., Earleton.  
 Shriner, Ike M., Largo.  
 Shultz, W. W., Haines City.  
 Sias, D. P., Orlando.  
 Siedenburgh, A. E., Box 17, Oneco.  
 Simmonds, Edward, Miami.  
 Simmons, H. H., 25 N. Ocean St., Jacksonville.  
 Simmons, Mrs. H. H., 43 W. 8th St., Jacksonville.  
 Simmons, Paul, Ocala.  
 Simpson, C. C., Ocala.  
 Simpson, James, Mt. Dora.  
 Sinclair, C. E., Altamonte Springs.  
 Skelly, F. L., Orlando.  
 Skiff, Dr. Ernest G., Sebring.  
 Skinner, A. E., Dunedin.  
 Skinner, B. C., Dunedin.  
 Skinner, Miss Elizabeth, Dunedin.  
 Skinner, F. L., Dunedin.  
 Skinner, L. B., Dunedin.  
 Skinner, Mary E., Dunedin.  
 Skinner, R. E., Dunedin.  
 Slagle, M. C., Ft. Lauderdale.  
 Slattery, J. M., Exchange Supply Co., Tampa.  
 Smith, Cleve. F., Largo.  
 Smith, Frank A., Box 1065, Orlando.  
 Smith, Gould, Naples.  
 Smith, G. T., Winter Haven.  
 Smith, H. M., Winter Haven.

- Smith, J. A., Lake Alfred.  
Smith, J. Horace, Orlando.  
Smith, Lonnie S., Box 587, Largo.  
Smith, Mrs. O. E., Wauchula.  
Smith, O. E., Wauchula.  
Smith, V. C., Fruitland Park.  
Smith, W. J., Winter Haven.  
Sneed, H. F., Altamonte Springs.  
Snell, J. V., R. F. D. 2, Box 98, Bartow.  
Snell, Wm. H., care James L. Waterbury Co., Bradentown.  
Snell, W. R., Winter Haven.  
Snively, J. A., Winter Haven.  
Snook, Samuel, Weirsdale.  
Snook, T. B., Weirsdale.  
Snook, Mrs. T. B., Weirsdale.  
Snow, Minabel, Box 283, R. A. Miami.  
Soar, Ira, Dade City.  
Soar, J. J., Little River.  
Southern Cattle Feeding Co., Green Cove Springs.  
Southern Fertilizer Co., Orlando.  
Spencer, A. P., Gainesville.  
Sperry, C. A., Box 205 B, R. F. D. 2, Tampa.  
Sperry, W. D., Lakeland.  
Squires, J. R., Orlando.  
Stall, B. E., Route 1, Tampa.  
Stansfield, Chas., Wauchula.  
Stebbins, Henry H., Thonotosassa.  
Stephens, C. R., Glen St. Mary.  
Stephens, Ernest, Elfers.  
Stevens, H. B., DeLand.  
Stevens, H. E., Ft. Myers.  
Stevenson, E. M., Gainesville.  
Stevenson, G. A., Elfers.  
Stewart, C. E. Jr., care Citrus Exchange, Tampa.  
Stockett, A. W., Bee Ridge.  
Stokes, C. R., Sebring.  
Stone, O. T., Gainesville.  
Stout, A. M., Sebring.  
Strait, O. W., Thonotosassa.  
Straley, S. V., Orlando.  
Stratton, Geo. H., City Point.  
Straub, H. L., Weirsdale.  
Strickland, W. H., Hallandale.  
Strickland, H. M., Hallandale.  
Stringfellow, W. M., Pineland.  
Strode, J. H., Winter Haven.  
Stubbs, C. J., Ft. Myers.  
Sunshine Fruits Co., Coconut Grove.  
Swan, J. L., Lakeland.  
Swanke, Geo. Lake Wales.  
Swanson, A. L., West Palm Beach.  
Swartz, A. H., R. F. D., Orlando.  
Swope, O. P., Oviedo.  
Symonds, A. D., Route 1, Orlando.
- Taber, Mrs. G. L., Glen St. Mary.  
Taber, G. L. Jr., Glen St. Mary.  
Talbot, W. O., Goulds.  
Tanner, A. A., R. F. D., Box 67, Leesburg.
- Tanner, F. A., Wauchula.  
Taylor, Mrs. B. W., Box 119, Jupiter.  
Taylor, H. E., First National Bank, Gainesville.  
Taylor, Jas. A., Oak Hill.  
Taylor, Jno. H., Ocala.  
Taylor, Jno. S., Largo.  
Taylor, Robt., Orlando.  
Taylor, W. D., Ocala.  
Taylor, W. O., Ocala.  
Taylor, Mrs. Wm. H., Box 6, Rood.  
Taylor, W. S., 3905 Ashley Ave., Tampa.  
Temple, Mrs. W. C., 4 Chase Ave., Winter Park.  
Ten Eyck, Wayne E., Ocala.  
Terwilligar, A. C., Titusville.  
Thacker, R. A., 929 S. Dakota Ave., Tampa.  
Tharp, Wm. H., care of James L. Waterbury Co., Bradentown.  
Thayer, G. E., Crooked Lake.  
Thayer, Lloyd, West Palm Beach.  
The Fellsmere Co., Fellsmere.  
Thomas Advertising Service, Jacksonville.  
Thomas Hardware Co., Gainesville.  
Thomas, Irving J., Coconut Grove.  
Thomas, Jefferson, care of Thomas Advertising Service, Jacksonville.  
Thomas, J. M., Ocala.  
Thomison, John, Box 1064, Titusville.  
Thompson, C. H., Box 818, Winter Haven.  
Thompson, Mrs. C. H., Box 818, Winter Haven.  
Thompson, Dr. J. L., Frostproof.  
Thompson, Ralph P., Winter Haven.  
Thornton, W. R., Redland.  
Thys, Leon, Elfers.  
Tillinghast, B. F., Crescent City.  
Tillinghast, Mrs. B. F., Crescent City.  
Tillinghast, Miss Helen, Crescent City.  
Timmons, M. J., Citra.  
Tippin, Geo. T., Vero.  
Titus, H. S., Dunedin.  
Titus, R. W., Oak.  
Titus, W. H., Sutherland.  
Titus, Mrs. W. H., Sutherland.  
Todd, R. H. Lumber Co., Ocala.  
Toms, Chas. S., Box 167, Miami.  
Tourtellatte, L. E., Limona.  
Townsend, J. F., Lake Wales.  
Townsend, J. L., Route 1, Box 30, Wauchula.  
Trantham, T. S., Ocala.  
Treat, J. A., Orlando.  
Tresher, George, 413 Rosaline Ave., Orlando.  
Troxler, T. W., Ocala.  
Truskett, E. E., Mt. Dora.  
Tubb, J. M., West Palm Beach.  
Tucker, C. M., Gainesville.  
Tucker, Mrs. Helen S., Merritt.  
Tucker, H. W., Ocala.  
Tuller, R. J., Leesburg.  
Tupper, E. R., Lutz.  
Tydings, Mrs. C. R., Ocala.  
Tyler, A., Glen St. Mary.  
Tysen, J. R., 1844 Pearl St., Jacksonville.



- Ulmer, Henry L., Largo.  
Umlauf, Gustaf, Gainesville.
- Vail, Rev. Alfred T., Sebring.  
Valentine, George C., Palmetto.  
Van Fleet Co., Florence Villa.  
Vaniman, O. S., Ft. Lauderdale.  
Van Kleek, John H., Sebring.  
Van Osten, R. L., Ocala.  
Van Nieuvenhirvy, Ernest H. J., Jenks Hill, Taylorsville.  
Van Roy, Frederick, Crystal River.  
Vick, J. H., Orlando.  
Vidal Drug Co., Gainesville.  
Vivian, H. B., Miami.  
Von Behren, W. J., West Palm Beach.
- Waddell, Edwin A., 235 12th St., Miami.  
Wadsworth, D. L., Wimauma.  
Wait, Leslie P., Apopka.  
Wakelin, G. M., Tavares.  
Walcott, A. D., Auburndale.  
Walcott, Mrs. A. D., Auburndale.  
Waldrop, J. P., Winter Haven.  
Waldron, Max, Route A, Lakeland.  
Walker Bros., Orlando.  
Walker, E. K., Wauchula.  
Walker, G. P., Clearwater.  
Walker, M. R., Eagle Lake.  
Walker, R. F., Orlando.  
Walker Seth S., 210 Franklin Sq. Bldg., Tampa.  
Walker, Shirley B., Route B., Miami.  
Walsh, C. A., R. F. D. No. 1, Ft. Lauderdale.  
Walters, H. W., Ocala.  
Ward, C. H., Winter Park.  
Waring, R. D., Orlando.  
Warnell, Lumber & Veneer Co., Plant City.  
Warner, L. R., Box 484, Key West.  
Warner, S. C., East Palatka.  
Warren, Alfred, Ft. Pierce.  
Warren, Geo. E., 216 12th St., Miami.  
Wartmann, E. L., Citra.  
Wartman, H. A., Ocala.  
Waterman, H. A., Ocala.  
Watters, J. Henry, Ocala.  
Watts, B. F., Leesburg.  
Webb, E. N., Miami.  
Webb, W. H., Winter Haven.  
Webster, Miss Agnes I., Tallahassee.  
Wedge, Clarence, Ft. Lauderdale.
- Weiland, Chas., Estero.  
Weissinger, J. E., care Aripeka Saw Mills, Tampa.  
Wells, B. B., City Point.  
Wenalden Co., Plymouth.  
Wendle, Henry, Gotha.  
Werner, Robt., Box 3, Palm Beach.  
West, C. J., Lake Sterns.  
Westbrook, Sam W., care L. & N. Ry., Pensacola.  
Whitaker, Mrs. Mabel Hendry, Ft. Pierce.  
Whitaker, W. R., Manatee.  
White, A. L., Ft. Myers.  
White, Geo. E., Gainesville.  
Whitehouse, Thos., Sebring.  
Whittington, C. E., Box 925, Orlando.  
Whiteside, F., Box 472, Ft. Lauderdale.  
Wigfield, Miss Virginia, Box 42, Quay.  
Wightmann, L., Box 576, Tampa.  
Wilkins, Col. Willis, care of Epping & Co., San Juan Hotel, Orlando.  
Wilson Co., Gainesville.  
Wilson, J. I., Box 324, Miami.  
Wilson, J. P., 511 S. Kentucky Ave., Lakeland.  
Wilson, Sylvester E., Orlando.  
Wilson, W. C., Winter Garden.  
Williams, L. G., Keystone Park.  
Williams, Simon F., 602 Professional Bldg, Jacksonville.  
Williamson & Dennis, Box 1812, Jacksonville.  
Willis, A. J., Oakland.  
Willits, Chas. O., 104 N. Rosalind, Orlando.  
Wilmshurst, H. J., Box 84, DeLand.  
Wimnicht, C. L., Lake Gem.  
Winchester, E. L., Boynton.  
Winston, J. R., Orlando.  
Witherington, J. R., Apopka.  
Withers, Aaron, Sebring.  
Woodrow, David S., Ocala.  
Woodruff, Hamilton, Box 1154, Jacksonville.  
Woodside, T. W., R. F. D. 1, Orlando.  
Worthen, S. T., 349 Fifth St., N., St. Petersburg.
- Yocum, W. F., Ocala.  
Young, A. I., Sebring.  
Young, J. H., St. Cloud.  
Young, P. K., Pensacola.  
Yount, A. H., Ft. Lauderdale.  
Yowell, N. P., Orlando.
- Zellner, H. Grady, Lakeland.  
Zurn, H. A., Orlando.

# Proceedings of the Thirty-Third Annual Meeting of the Florida State Horticultural Society

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In the January 16, 1889 issue of the Florida Agriculturist, Mr. A. H. Manville writes as follows: "Certainly the little knot of Florida men, one of whom was Mr. Adams, at the last meeting of the American Pomological Society at Boston, were not lacking in self-reliance nor in confidence in their fellow fruit growers when they invited the society to hold its next meeting in Florida. At that time there was not a live organization of soil tillers in the State. They came home, got together a few progressive men and organized the 'Florida Horticultural Society,' which has already done more to promote the horticultural interests of the State than any similar organization we have ever had, and which has mapped out work for the future that will be of incalculable benefit to the State and which we have faith to believe it will accomplish, because of the character of its members and what they have already done."

Mr. Manville was not wrong in his prediction. Florida horticulture of today is the accomplishment of this little group and their co-workers of later years. The members of the Horticultural Society have been the leaders in

the industry, and its meetings, the clearing house for the ideas that have made the industry.

Of the founders, there are three living today—Messrs. G. L. Taber, Glen St. Mary; L. W. Lipsey, Blanton; B. L. Anderson, San Mateo. This year, on May 4-7, the society came back to its birthplace—Ocala—to hold its thirty-third annual meeting, and at the opening session on the night of May 4, two of these gentlemen with their fellow members of later years, discussed reminiscences. There were more than twenty present who had been members twenty-five years or longer. The occasion was a memorable one and an inspiration to the younger members.

While the thirty-third annual meeting was not as largely attended as some in the past, it was one of the most successful and enjoyable ones that the society has held. This was due largely to the genial hospitality of the people of Ocala and Marion county. The Board of Trade, the Rotary Club and the Women's Club co-operated in doing everything possible for the comfort and entertainment of their visitors.

The meeting was notable for three

reasons: First, the adoption of an amendment to the constitution that creates two new classes of memberships, and of a by-law that provides for an endowment fund; second, the attainment of a high mark in total membership; and third, the reunion of the older members.

The constitutional amendment provides for a patron membership that pays one hundred dollars to an endowment fund for the society, and a perennial membership that pays its annual dues five or more years in advance. The by-law provides for the investment of the funds received from these memberships and from gifts.

The amendment and the by-law makes possible an endowment fund that will place the society on a sound financial basis. It is expected that the patron membership fees will be supplemented by gifts that will make the en-

dowment fund sufficiently large to enable the society to increase the size and quality of its publications and to do constructive work that has hitherto been impossible. Within a few minutes after the passage of the amendment twenty-one patron memberships were volunteered.

This year the society has reached its high mark from the standpoint of members. At the time of going to press, the total membership is 1,626, of which 21 are patron members; 135, life members; 3, perennial members, and 1,467 annual members. This splendid showing is due to the active work of Messrs. Russell Kay, D. C. Gillett, Wilmon Newell, A. P. Spencer, W. H. Brokaw, Harry Borland, Louis H. Chazal, the field men of the State Plant Board and the Extension Division of the College of Agriculture and many others.

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Hume: The thirty-third annual session of the Florida State Horticultural Society will now come to order. We will have an opening prayer by the Reverend J. J. Neighbor, of Ocala.

Prayer.

Introduction by H. Harold Hume: Among the original eighteen founders of this Society is a man who has occupied numerous positions in connection with it. He has been its Secretary; he was its Vice President; and from the year 1896 until 1905 he was its President. It seems to me that in coming back to the starting point of the Florida State Horticultural Society it will be

very fitting that he should take charge of this meeting tonight, and I am going to ask Mr. G. L. Taber to take the chair.

G. L. Taber: I shall have to ask your indulgence, ladies and gentlemen, because it has been some years since I resigned, and if I don't know all of your names offhand and don't recognize you as soon as you think you ought to be recognized, you must remember that it is because I am older than I used to be. We will now have an address of welcome by Robert J. Anderson, mayor of Ocala.



# Address of Welcome

Robert J. Anderson

*Ladies and Gentlemen:*

It is with a great deal of pleasure that I welcome, on behalf of the city of Ocala, the members of the Florida State Horticultural Society. Ocala feels honored in receiving again, after a lapse of thirty-two years, the Society which was organized here and which returns now, prodigal only in good deeds and in general benefits to the State at large.

I am told, although a little prior to my time, that in the year 1888, Ocala and Marion county were the centers of the orange growing industry. In that year this Society was organized. Immediately following its organization, and as a direct result of it, Ocala was chosen as the place for the Florida International and Semi-Tropical Exposition. And in the year 1888 when the Society was first founded, plans were laid for the giving of the Exposition and it became a realized fact in 1889. The Florida State Horticultural Society at the tender age of one year entertained the American Pomological Society and the Horticultural Society of Georgia.

The Florida International and Semi-Tropical Exposition had an imposing name, but the name was no more imposing than the display itself. People who have had the opportunity of seeing expositions of the sort, have told me that nowhere else have they seen such an exposition of flowers and fruits as was in Ocala at that time. Follow-

ing that and as a result of it, the Farmers' Alliance was asked to meet here. That was in the year 1889. Indirectly again the results of the organization of the Horticultural Society are here, and at its meeting in 1890 they adopted the now famous "Ocala Demands Political Tenets" which have become a part of the creed of practically every political body of any standing today.

You will see, therefore, that Ocala is greatly indebted to the Florida State Horticultural Society. At that time Ocala and Marion county were supreme in the horticultural world in Florida. The best fruit, the finest fruit were grown there, but the freezes of '95 and the extension of the railroad have opened up in the country to the south of us some places better equipped than we are, to grow those fruits; and Marion county has had to share the throne and the scepter, that once belonged to her, with others, but she has not yet abdicated. She has still some of the finest groves in the State of Florida and produces some of the finest fruit.

Ocala is the birthplace of the Horticultural Society and we think it fitting that it should meet here, and we appreciate their meeting here for the reason that it gives the citizens of Ocala the chance to pay, in some part, an old debt, a debt of thirty years standing, in hospitality. Again I welcome you to the city of Ocala.

# A Brief History of the Citrus Fruit Industry of Marion County, Florida

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By E. L. Wartmann, Citra, Fla.

## Foreword

Members of the Florida State Horticultural Society, Ocala welcomes you! This is your home, your birthplace.

At a meeting of the Florida Nurserymen's Association, in the parlors of the Ocala House, April 10, 1888, at which were present members of the Fruit Growers' Association and other horticulturists, the Florida Horticultural Society was born.

On February 20, 1889, the Florida Horticultural Society entertained the Georgia State Horticultural Society and the American Pomological Society, in the great building of the Semi-Tropical Exposition, in Marti City, just west of the present Marion County Fair grounds, in Ocala.

And now, on the 4th to the 7th of May, 1920, you are gathered here again, with your headquarters again in the Ocala House, for your 33d annual meeting.

We ask you to accept this brief history of citrus growing in Marion county, as a memento of your own home and the home of the orange. To accurately outline the citrus industry of Marion county requires going back to the days of pioneering, and to a pe-

riod long before the boundary lines of the county were established.

## Wild Orange Groves

The early writers of Florida history tell of the wild orange groves located in central-south Florida; and soon after the Territory of Florida was ceded by Spain and assumed her Statehood, many planters from the Carolinas and Georgia came to this section to grow sea island cotton—a product then in great demand and highly profitable. In clearing these plantations for cotton planting, it was necessary to destroy thousands of wild orange trees. Most of this area of wild citrus trees was located in Marion county, largely on the southern and western borders of Orange Lake, and along the valley of the Ocklawaha.

## A Native Fruit

This brief history is merely given to establish the fact that where the orange tree grows wild, it must, therefore, in its native element, find conditions of soil most suited to its nature.

## The Year 1870

About the year 1870 the idea was advanced that these wild orange



groves could be developed into a paying enterprise; and so the orange industry was inaugurated.

On the southern shore of Orange Lake, large tracts of land were acquired by far-seeing individuals, and by grafting and budding the wild orange, they shortly thereafter enjoyed the realization that they had successfully started a business which was to make Florida famous, and a pleasant occupation to follow.

### On Orange Lake

A small village in the northern portion of the county, and bordering on the south shore of Orange Lake, was, during the years 1892-3 and 4, the largest shipping point for citrus fruit in the world, and from that point was shipped out about twenty per cent of the entire crop of the State. During that period, about one-tenth of the taxes collected in Marion county was derived from assessments against the orange groves bordering Orange Lake. From the railroad station referred to, was shipped during the season of 1894, approximately one-half million boxes of fruit. Also, from the various groves of this lake region, were shipped enormous quantities of both sour and budded trees for groves being set out at points farther south, and to Arizona and California.

### The "Pineapple"

Marion county may truthfully claim the distinction of introducing the most sought after orange grown for the markets up to the present time. This refers to the "pineapple" variety, which

is distinctively of Marion county origin. This orange is unsurpassed in color, smooth texture and shipping qualities. During the past season fancy fruit dealers have bid as high as \$12.75 per box in the auction rooms of New York City in order to obtain this variety of orange, proving conclusively its merit and popularity.

The name "pineapple" is derived from the aroma of the fruit, and not its flavor. Anyone familiar with this orange can readily detect its presence in a packing house where there are but a few mixed in with a house full of other varieties. The soil in the Orange Lake region is peculiarly adapted to the culture of this particular orange; and in no other place in the State of Florida, can the deep orange red, and the quality of the fruit be produced in successful competition.

### The Parent Tree

The parent tree of the "pineapple" orange was one among a few sweet, or "china" orange trees growing around the home of a cotton planter, Dr. James B. Owens, a few miles south of Orange Lake. One of the first growers of oranges in that section, Hon. P. P. Bishop, on a visit to this plantation, was struck with the general appearance and quality of the fruit he noticed on the tree. He purchased from Dr. Owens the tops of nine trees of his selection, the fruit of which was of especially smooth peel "seedling orange." These tops were cut into bud wood and then grafted in the wild orange trees in his grove in Citra. In time, when



these budded trees were brought to bearing, and the fruit sent to the packing house, an odor was detected, very different from that of the ordinary orange, and not unlike that of the pineapple; this variety of fruit was afterwards known as the "Pineapple" orange.

### "Parson Brown"

Marion county may further point with pride to the "Parson Brown" orange, known to be the most perfect early orange grown.

This fine variety of orange was discovered within a few miles of the line of Marion county and is largely the variety grown in the Lake Weir section. Only a few months since, a leading fancy fruit house in the north invested nearly a quarter of a million dollars in groves of this variety at Lake Weir, thereby showing their faith in Marion county as a fruit growing section.

Frequently the question is asked: Why, if Marion county was the first and greatest citrus producing county, has it not kept pace in this enterprise with the sections farther south?

### The Freeze of '95

Prior to the disastrous freeze of 1895, Marion county was almost covered with orange groves. The interior was dotted over with small orchards, and every house seat had its orange trees. The railroads and public roads passed by and through a veritable forest of citrus trees, and the traveler was impressed and convinced that the place had indeed been reached where the orange tree flourished in its natural beau-

ty, and where the inhabitants were both prosperous and contented. The business was a fascinating and highly profitable one, and many a man strained his finances to the limit in acquiring and enlarging his grove interests.

### A Rich County

When the freeze came, many in the orange business were left without means to carry on. Some, in a small way, attempted to rehabilitate their destroyed property. Others abandoned them entirely and engaged in other pursuits. The rich lands of Marion county offered such splendid opportunities for truck growing, stock raising, general farming, phosphate mining, lumber and naval stores, that many changes and diversions in business took place, and citrus growing was more or less neglected. But a few of the former orange growers held onto their property with a determination to bring the trees back to a profitable state or condition. Those who made this attempt have no reason to regret it, and the result of their efforts may be plainly seen.

### What One Man Did

Does orange growing in Marion county pay? The following is the result from one grove—the Kendig, or "Wissahickon," a fifty acre tract located five miles south of the margin of Orange Lake. Mr. John Kendig, of Philadelphia, came into possession of this property in 1898—three years after the cold of 1895. It was soon brought into bearing, and has yielded a crop of

fruit each year since. The aggregate number of boxes gathered from this grove since it began to fruit is 99,860. It may be safely asserted that the net proceeds per box to the owner was \$2, making around \$200,000.00. The owner states that but two years out of fifteen did a deficit occur, while thirteen years showed a handsome profit. The trees set in this grove came from the famous Bishop-Hoyt Company grove at Citra, and are of the "pineapple" variety.

While our grove properties do not border the highways and railroads of our county as they did in the years that are gone, there are many handsome and paying orange groves away from general public view, producing a quality of orange which cannot be sur-

passed by any other section of the world.

### Success Assured

The winter temperature, subsequent to the freeze of 1895, has not, on an average, been any lower than it was prior thereto; and one may invest in or start an orange grove in this county with as much assurance of success at the present time, as at any period during the history of the business.

Marion county possesses many available acres of rich hammock and pine lands, suitable for orange culture, and it is only surprising that people coming to the State for the purpose of growing oranges, pass by these fine lands and locations in Marion county, to start their groves on poorer land in other sections of the State.

## Response for the Society

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B. L. Hamner

*Mr. Chairman, Mr. Mayor:*

On behalf of the Society, I want to express its appreciation for your cordial welcome, and I think it is fitting at this time that you know something of the character of the men and women who form this organization, so that you may know that it is not the return of the prodigal son. You know that they say that farmers can never organize and hang together, but I note on the platform here this evening members of this Society who have been members for twenty-five years, and there is quite a number of them. I think that shows that at least in Florida the farmers can hang together in some degree.

Now I want to tell you something of the work of this organization, that the people of Ocala may know who it is they are entertaining. This Society meets every year and it is the work of this Society to take up horticultural subjects and study them with the object in view of increasing production and taking care of the products that we have, and thereby practice conservation. At this time in the history of our country I think that an organization which works to that end is worthy of great praise. It is said that in this country today, there are seven

hundred presses running night and day turning out literature teaching Bolshevism and other radical socialistic ideas and in this country there are many who are preaching and teaching false economies and false doctrines.

We have the discussion in this country of how to decrease the high cost of living, but the sane man knows that the high cost of living can be remedied only by production and by service and by conservation. This Society is studying production and conservation. Its members are people who produce food that those in the North may use it and may live. Since this organization was started in your city thirty-two years ago, at which time the production of oranges was very small, production has grown until I think that the value of the orange and grapefruit crop in the State now approximates thirty million dollars. So I say to you that this Society, since it left Ocala, has a record of which it can be proud. I feel grateful at this time to Ocala and to Marion county, and I appreciate your welcome because it is not only a birthplace of this organization, but it has by its splendid agriculture and its animal husbandry taught the people in this State and is teaching the people that better livestock can be raised when you have a proper No-Fence Law which at



this time is my particular object. (Laughter.)

It is true that we owe much to Ocala and Marion county, because it was here, in this county, that the Parson Brown orange was produced and I think, too, that the Pineapple orange originated in your county on or near

Orange Lake. I say that the county which has given so much to the horticulture of the State, and the people who have contributed so much to the birth of this organization are splendid hosts and we all of us are glad to come back and receive your hospitality.

# President's Annual Address

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H. Harold Hume

*Mr. Chairman, Members of the Florida State Horticultural Society, Ladies and Gentlemen:*

Tonight we are gathered here, where this society had its beginning thirty-two years ago, and there is on the part of all of us an interest in the history of our development. When those eighteen founders of this Society met on that April day in 1888, what was their vision? Did they foresee the size to which the industry in which they were interested would grow? Did they foresee the multitude of changes related to the crops they grew which the following years would bring about? Hardly, for it is not given to human kind to see far into the future. That little band of men was full of hope, full of enthusiasm, full of courage. But had they seen, could they have seen what the future held, to what heights might not their enthusiasm have risen? Why had they come together? Their meeting was born of the desire to seek help from others, to give in return that which they had learned in the hard school of experience; and to help other workers in the same field.

For those days were hard days. The many agencies which now respond to the grower's call for help did not then exist. The unsolved problems were

many. They could look for help from no one but themselves.

It is interesting to note that shortly after this there came into the State a man whom all of us know, a man who through thirty years has worked, in season and out, for the horticultural interests of Florida. And since an institution is but the lengthened shadow of a man, then the Florida Agricultural Experiment Station with all of its achievements is but the lengthened shadow of P. H. Rolfs.

And now it is my purpose to direct your attention in a cursory way to some of the changes which have taken place in thirty-two years. For the things in which we are interested are subject to constant change. They either go forward or backward, but they never stand still.

Today, as in 1888, the sweet orange is Florida's most important fruit crop. Never has its place been questioned; never is it likely to be. But what changes have come about and in what various ways has it affected and built up related industries? Note its effect upon our transportation systems—an effect so great that they have almost snapped under the strain; an effect so great that many miles of needed rails have been laid to take out the crop and to open up new areas.

In 1888 almost every grower picked, packed and marketed his own fruit. There were as many packing houses as there were grove owners. Today all that is changed. You may go for miles in the citrus sections of the State without seeing a packing house. Nearly all the fruit is now handled by marketing associations, or by individuals or corporations who perform the same functions, and packed in central packing houses. This has been for the betterment of the industry—most decidedly so. It has made for uniformity of product and pack; it has made for wider distribution; and these have been important factors in obtaining for the Florida citrus crop the commanding position it now occupies in the American market. The tendency is strong toward still more intense concentration in the marketing field and there is no doubt but that it will be brought about in the future years.

Among the things which interested the founders of this Society were the varieties of sweet or round oranges and they were many. Most of them have disappeared from commercial plantings made recently and from nurserymen's lists. The fruit list published in the Florida State Horticultural Society report for 1897 contained sixty-seven varieties of sweet oranges. Now scarcely a half dozen sorts are propagated by Florida nurserymen.

Do not mistake me for I do not mean to say that all these were recommended for planting, but they were under test by various members of this society and they could be secured somewhere.

Of the half dozen or so oranges commercially planted today, only one is a foreign introduction; and two or three of the remaining ones originated not far from Ocala. I refer to the Parson Brown, our best early orange; to the Pineapple, our most noteworthy variety; and to the Homosassa, without an equal as a heavy bearer.

Let me relate an incident showing how far we have journeyed in the last thirty or forty years. A few days ago, I picked up a catalogue issued by one of the early nurserymen of this State and glanced through its pages. It was for the year 1885. The nurseryman was offering 50,000 sweet seedlings to planters for the planting season of 1885-1886 and it was several seasons after that before named varieties of oranges, budded trees, were offered for sale. I really believe one might have difficulty in finding fifty sweet seedlings for sale in any nursery in Florida today, to say nothing of 50,000.

Florida contains today the largest area of grapefruit orchards to be found in any citrus district in the world. In 1888 there was none of it, as we know it now. In fact it was scarcely known as a market fruit. Grapefruit culture is distinctly a development of the last thirty or forty years. It may be as well now as at any other time for me to say that grapefruit is peculiarly and distinctly an American fruit. It appears to have no counterpart among the earlier fruits in Europe, and is not to be found there except where it has been introduced from America. It is not found in Asia, the natural home of the citrus group. It is probably an off-



shoot from the shaddock, but it is of American origin, probably West Indian. Its progenitors came from the East, but it is American in its development—American in the place it occupies in horticulture. What the next thirty years will bring forth, cannot be foretold, but it is a safe forecast, that then as now, Florida will produce by far the largest portion of the grapefruit used in America.

In 1888, there was an interest of considerable extent in Florida in the culture of lemons. Today there is none. Such lemon plantings as were made have disappeared. Either the trees have been destroyed or they have been top-worked to oranges and grapefruit. The lemon failed because it was not sturdy enough and for the further reason that after it had been grown and harvested there was a curing problem. These difficulties together with some others proved too much for the lemon and it has, in consequence, disappeared from commercial citrus plantings in Florida.

Limes occupy a more prominent place today than in 1888. But their culture is confined to a comparatively small area. Outside of the Florida keys and adjacent territory but little fruit is produced.

Acid citrus fruits are of more importance in America now than at any previous time in our history. Prohibition has greatly increased the amounts consumed and it is to be regretted that at this time, Florida (I am speaking of our large citrus areas) is unable to make her contribution to the quenching of the thirst of the nation. But

here I will make another prediction, that before another thirty years have passed Florida will be a factor in the acid fruit market in a way she is not now; and that hardy acid fruits will be grown under all conditions, at least where the sweet orange is grown.

Kumquats were scarcely known in Florida thirty-two years ago. While this citrus fruit has not secured a place in a large commercial way, yet it is a valuable fruit from a culinary standpoint and I believe that it will occupy a large place in manufactured citrus products in the future.

Thirty-two years have seen the rise and fall of the pear industry in northern and western Florida. Heavy plantings were made and pear growing showed every indication of becoming one of the staple lines of fruit growing in the State. But pear blight practically wiped it out and now pears are a small, unimportant sporadic crop. But it is my opinion that thirty years more will see pear growing again established in Florida on a foundation built with blight-resistant varieties. The whole problem is being attacked in a determined way by several investigators and as the foundation stocks are already in hand, success is sure to follow. It is a notorious fact that in the past twenty years the pear industry in the United States, in quantity of fruit produced, has increased not at all. New plantings have no more than compensated for the trees destroyed by blight. It is too important a line of fruit growing to remain in that condition, when there is certainly a 100 per cent chance for improvement.

Pecan growing as a Florida horticultural industry is a development of the past twenty years. Now, many thousands of acres in north and west Florida are planted in orchards with trees of this valuable nut, and although it does not come into full bearing quickly, already hundreds of cars of Florida nuts are placed on the market annually. Each crop carries with it, its own peculiar problems which must be solved before its culture can go ahead, and nothing in horticultural development is more interesting than the propagation of the pecan. No longer ago than 1896, Andrew Fuller, a noted American Pomological writer, commenting upon the statements of Col. Stuart, a pecan pioneer, concerning the propagation of the pecan by annular budding, wrote: "He then proceeds to describe the operation, as given in all works on the propagation of trees and plants during the past hundred years or more, but not a word to indicate what he considers a success, whether it be once or fifty times in a hundred, or if he ever succeeded in making an annular bud unite to the stock; I am more inclined to think that he never did, than otherwise." Yet, year after year, thousands of pecan trees are now propagated by annular budding.

In referring briefly to plums, I shall use them as an example of what the early horticulturists did along many similar lines and of what their successors try to do now from time to time, even to this day. Plum growing was first attempted with northern and European varieties. Nothing came of them. Then the Japanese sorts were

brought in and widely heralded as the plums that would give Florida all the fruit of this sort that it needed. But not much came of them either. Eventually, however, crosses between the Japanese and native plums came into existence and today one may plant these in many parts of Florida with reasonable assurance of securing fruit when the trees are grown.

Much the same way was traveled with peaches. The northern forms were tried out, but, with the exception of a few spots in western Florida, without results. It was not until the Southern Chinese strains were introduced that varieties were secured adapted to the peninsular portion of the state. All of this has taken place within the memory of the older members of this Society.

Our trucking industry was born of misfortune, and it owes its larger development to the opening up of new areas within the past thirty-two years. Today in variety it surpasses, and in magnitude it equals, the citrus industry of our state. Our founders hardly glimpsed its development.

Before leaving this phase of my subject, I want, for a moment, to call your attention to the present status of the world old warfare that man has waged against his insect foes. Doubtless the Egyptians woke up one morning and got busy with such things as they could devise when the plagues came upon them. And the early members of this Society, when their troubles came, as they came from time to time, were as those Egyptians. And we passed through an era of spraying, wherein

the concoctions used did as much, or in some cases more, damage than the pests that were to be controlled. Remember this—that our entire spraying program, with all the materials and all the machinery that goes with it, is a development of the past thirty years or so.

Machinery does more for us now than thirty years ago. Today the mule or horse might disappear entirely from the fields where our horticulture crops are grown and we would not miss him. Related to many operations, he is already gone.

What does the future hold in store for the various industries in which we are interested? Who can say? At any rate, it is not too much to forecast that the development of the next thirty

years will surpass the development of the past thirty. There is more power, there is more impetus behind the whole movement.

Now, in conclusion, let me say that today the Florida State Horticultural Society is held together by the same common interests that brought its forefathers together. It has served Florida well and every one interested in the Horticulture of the state should feel it his duty to support it. We stand tonight, in relation to the future where our founders did in 1888 and the development of Florida depends largely upon the keenness of vision, the good judgment, the courage with which we attack the problems which will arise from time to time.



## A Bit of History

G. L. Taber

*Mr. President, Ladies and Gentlemen:*

There are times in the lives of many of us, occurring oftener as we grow older, when circumstances and surroundings combine to produce conflicting emotions. This, fellow members, is to me such an occasion. I am glad to meet with you again and to contribute my "Bit of History," but this pleasure is tempered with sadness as memory recalls names, faces, friendships of many departed members, including nearly all of those who were active in the Society's formation, thirty-two years ago in this same city of Ocala.

It was pursuant to an invitation to other horticulturalists, issued by the then existing Florida Nurserymen's Association that a few of us met at the Ocala House on April 10, 1888 and organized the Florida State Horticultural Society. At that meeting there were eighteen who subscribed to the constitution and became members as follows:

Dudley W. Adams, Tangerine; J. B. Anderson, San Mateo; I. J. Brokaw, Anthony; A. Callahan, Melrose; J. P. DePass, Archer; E. DuBois, Tallahassee; R. D. Hoyt, Bay View; L. W. Lipsey, Citra (now of Blanton); A. H. Manville, Jacksonville; W. J. Merrill, Gardenia; James Mott, Orlando; R. W. Pierce, Indian Springs; Rev. Lyman

Phelps, Sanford; P. W. Reasoner, Manatee; O. P. Rooks, Gardenia; G. L. Taber, Glen St. Mary; H. L. Wheatley, Palm Springs; J. N. Whitner, Lake City.

Of the original eighteen but three are now living; namely, L. W. Lipsey, J. B. Anderson and myself.

I should perhaps qualify this by saying that this is in accordance with the only record known to be in existence. Mr. S. H. Gaitskill was present at the meeting but does not remember to have become a member at that time, although he did become a member shortly afterward. The first officers elected were as follows:

President, Dudley W. Adams of Tangerine; Vice-Presidents, W. K. Cessna of Gainesville, E. Dubois of Tallahassee, James P. DePass of Archer; Secretary, Geo. L. Taber of Glen St. Mary; Corresponding Secretary, D. H. Elliott of Sanford; Treasurer, J. B. Anderson of San Mateo; Executive Committee, Lyman Phelps of Sanford, P. W. Reasoner of Manatee, A. H. Manville of Jacksonville.

I would like here to call attention to a coincidence, worthy of note, that our first president was also first in the alphabetical list of members. None of us who knew him will ever forget the strength in leadership that we had in

Dudley W. Adams. He was a man of convictions, which he could forcefully present, and yet ready to extend to others the same right of independent belief that he claimed for himself. No society ever felt more acutely the loss of its leader than we did when he was suddenly taken from us.

One of the men who took a leading part in the organizing of this Society was Arthur H. Manville. While such a Society would doubtless have come into being later on, I think I am safe in saying that it would not have done so at that time but for him. Some of the older members may have a copy of his "Manville's Orange Culture," now out of print. He was also editor for a number of years of the "Florida Dispatch" and the "Farmer and Fruit Grower," and continued to contribute articles to the horticultural press almost up to the time of his death.

Two who were on the Society's first Executive Committee and whose names should be written large are Pliny W. Reasoner and Rev. Lyman Phelps. Both were untiring workers in the Society's organization. Pliny W. Reasoner's early death robbed the Society of a man that no Society or community could afford to lose. He died on Sept. 17, 1888; less than six months after the first meeting. In all that pertains to horticulture he was both an earnest teacher and an ardent pupil. He was universally beloved. He was one of my most intimate personal friends.

Rev. Lyman Phelps contributed valuable and efficient work for many

years. He was continually experimenting in the improvement of fruits and telling his experiences. His diction was precise and his address impressive. Up to the time of his death he left the imprint of his personality upon our Society's records.

Major O. P. Rooks contributed much to the personnel of the Society. He was an inveterate collector and always everywhere, whether on a train, in a hotel lobby, on foot or on horseback, carried a bundle of trees or plants. I am sure that if he were living today a specially deputized plant inspector would have to accompany him on his travels.

I should like to refer specifically to each one of the others of our founders, but time forbids. Sufficient perhaps to say that we were all very much in earnest, as is evinced by the fact that we undertook, at our very first meeting, to have the American Pomological Society and the Georgia State Horticultural Society meet with us in the succeeding year in this same city of Ocala. Invitations were extended and accepted and on February 20, 1889, the three horticultural societies held their joint opening session in a building that also contained the finest display of horticultural and agricultural exhibits that had ever been brought together in the State. I refer to the great building of the Semi-Tropic Exposition at Ocala.

I am a life member of the American Pomological Society and have a full set of its printed records. I think you may be interested in some excerpts from its 1899 report:



### Programme, Opening Session

1. Call to order by President Berckmans.
2. Prayer by Rev. C. B. Wilmer.
3. Welcome on behalf of the Florida State Horticultural Society, by President Dudley W. Adams.
4. Welcome to the State by Governor F. P. Fleming.
5. Welcome to Ocala by Mayor Gary.
6. Welcome on behalf of the Semi-tropical Exposition, by President Geo. W. Wilson.
7. Response on behalf of the Society, by W. C. Strong of Massachusetts.
8. Appointment of a committee on Nomination of Officers.

I should like to quote the address of welcome to the visiting societies, delivered by President Adams, but time forbids. Those of you who have full files of our Horticultural Society will find it reprinted in the 1892 report.

For the fruits displayed in this wonderful exhibition, I find that the American Pomological Society awarded Wilder medals to: Lake County Shippers' Union; Marion County; Sumter County; Lee County; Rev. Lyman Phelps; E. H. Hart; Dudley W. Adams. Also bronze medals to Citrus County; Polk County; Volusia County; O. P. Rooks; E. S. Hubbard.

At this 1889 meeting of the American Pomological Society was made the first report of the Sub-Tropical Fruits Committee—a new committee appointed at the previous meeting to report for the first time at the meeting in Ocala. Its report was exhaustive and amongst

the names of those who contributed papers for that meeting are to be found those of the most prominent Southern Horticulturists of the early days.

That 1889 meeting at Ocala wound up in a blaze of glory through the courtesy of the railroads in extending an invitation for a ten days excursion through the State. This was accepted and, quoting again from the record:

"Upon the following day, which was Saturday, the visitors formed parties for various tours through the State, embracing Homosassa, Silver Springs, Tampa, Winter Park, Sanford, DeLand, St. Augustine, Jacksonville, and points as far south as Lake Worth.

"Most of the delegates remained in the State until the following week and then gradually dispersed to their homes."

In passing, I wish to say that the American Pomological Society has been twice entertained by our Florida Horticultural Society, the second time being at Tampa in 1911.

And now for reasons that will soon become apparent I wish to depart from the regular sequence.

I hold in my hand a copy of our first printed proceedings in book form. This was published in 1892 and records the proceedings of our fifth annual meeting held at Ormond, May 3, 4, 5, 1892. It also contains a brief history—all the official records we possess—of our Society up to that time. Let me explain by quoting from Secretary Stephen Powers' report as published in Proceedings of our meeting at St. Augustine in 1901:



"If the members of this Society will come with me I will conduct them through the streets of Jacksonville to the ruins of a certain house. In the middle there is a little heap of yellow ashes, and in places you can still trace the outlines of books and decipher some letters. Take up a handful of them and they have a very soft and velvety feeling. There is a large amount of good brain matter in those ashes, but our enterprising fellow members who manufacture fertilizers would not pay twenty-five cents a hundred for them for use in their goods. That little heap of yellow ashes is all that remains of the voluminous records and reports of this Society.

"I happened to have a few copies of the reports in my office. Mr. W. S. Hart, Mr. E. S. Hubbard and Dr. J. M. Hawks have kindly supplied some missing numbers, and with a little further assistance I can reconstruct the file."

You can thus see that our earlier official records, including those of the Florida Nurserymen's Association, which turned its records over to the Florida State Horticultural Society, went up in smoke in the great Jacksonville fire of May 3, 1901. This was something of a calamity to our Society at that time, and becomes more so year by year. To any of you who think the older members should be able to remember everything of moment, I would like to say, try it, and see how much you can recall with certainty that happened thirty-two, or thirty-one, or thirty or twenty-nine years ago. However, the two annual meetings succeeding the first two held in Ocala

were: 1890 at DeLand, and 1891 at Interlachen; which brings us back again to the 1892 meeting at Ormond and to our first printed report. At that time we had enrolled 238 members; more than thirteen times as many as we started with four years before. At that meeting it was decided that we should incorporate. This was put into effect and we became a corporate body for a term of ninety-nine years from May 20, 1892.

The names of the delegates for the Society who met at Sanford and signed the notice of incorporation were:

Dudley W. Adams, Lyman Phelps, W. S. Hart, E. O. Painter, A. C. Martin, Frederic H. Rand, S. H. Gaitskill, A. M. Thrasher.

The first officers of the incorporated body were: Dudley W. Adams, president; T. L. Mead, first vice-president; G. L. Taber, second vice-president; George H. Wright, third vice-president; W. S. Hart, Secretary; E. O. Painter, corresponding secretary; J. B. Anderson, Treasurer; executive committee, Lyman Phelps, C. F. A. Bielby, A. H. Manville; ex officio members of executive committee, president, secretary and treasurer of the Society.

The points at which the Society has held its regular annual meetings are as follows:

1888, organized at Ocala; 1889, Ocala; 1890, DeLand; 1891, Interlachen; 1892, Ormond (incorporated later in same year); 1893, Pensacola; 1894, Jacksonville; 1895, Jacksonville; 1896, Jacksonville; 1897, Orlando; 1898, Orlando; 1899, Jacksonville; 1900, Jacksonville; 1901, St. Augustine; 1902,

Tampa; 1903, Miami; 1904, Jacksonville; 1905, Jacksonville; 1906, Jacksonville; 1907, St. Petersburg; 1908, Gainesville; 1909, Daytona; 1910, Orlando; 1911, Jacksonville; 1912, Miami; 1913, DeLand; 1914, Palatka; 1915, Tampa; 1916, Arcadia; 1917, West Palm Beach; 1918, Ft. Myers; 1919, Orlando; 1920, Ocala; this meeting.

In addition to these annual meetings, there was one other meeting, held in Orlando in 1889.

I have a complete file of our records from the year we commenced publishing them in 1892 up till now. They contain about five thousand pages. If all bound into one book they would make a volume about eight inches by nine inches and sixteen inches thick. In addition to page after page of illustrations, equally valuable in their way with the printed page, they contain, at conservative estimate, 2,500,000 words. Some of these words may be superfluous; but, admitting that, in them are to be found the best horticultural thought, investigations, suggestions, recommendations and accomplished arts of this Society during the twenty-eight years that our reports have been published; as well as a summary of the first four years before we commenced publishing.

Not only are those volumes valuable in themselves, but the first seventeen have been made doubly so by a complete index of their contents. On the cover of this index appearing in our 1919 report is printed: "Index of the Proceedings of the Florida State Horticultural Society from the fifth

meeting in 1892 to the twenty-first meeting in 1908, by John Belling."

This index occupies thirty-four double columned pages and enables one to refer with certainty and dispatch to any contributor or any subject contained in the indexed volumes. To those who are fortunate enough to possess the volumes this index readily unlocks a very mine of horticultural wealth. If I may be allowed to make the suggestion here, I think it would be a good idea for the Society to consider having another index compiled at some time in the near future, making the valuable contents of our reports since 1908 equally available for ready reference.

The Society has had six presidents who have served in the order named:

Dudley W. Adams, G. L. Taber, C. T. McCarty, Prof. P. H. Rolfs, Dr. Wm. C. Richardson, H. Harold Hume.

Both Dudley W. Adams and C. T. McCarty were filling the presidential office at time of death. Both died suddenly without warning.

The other offices within the gift of the Society have been ably filled, and amongst those who are still with us and have not become weary in well doing, I wish to mention W. S. Hart, Treasurer, and E. S. Hubbard of the Executive Committee. They are two of the Society's wheel horses that have pulled together for lo these many years, and are still going strong.

And now a word in relation to deceased members: You will notice that I have mentioned only a few and that all, with the exception of C. T. McCarty, were of the Society's originators. I



had in mind, when I promised to make these historical remarks, to make up a list of our departed members and to devote a portion of the time allotted me to as suitable a remembrance of them as I could find words and strength to command. I did in fact have such a list made up, alphabetically arranged, with the date of death of each as taken from the necrological reports of our Society records. Although I knew we had suffered heavily, yet when I saw the list I was appalled. That list gives dates of death of ninety members of the Society and is still incomplete in that our records for the first four years were destroyed by fire, and also to the fact that at the time the list was made the committee to report at this meeting had not finished the compilation of its report.

The Society started with eighteen members and has since lost more than five times that number. Some were prominent officers; all were valuable members. Many were my close per-

sonal friends. Do you wonder that at this time I can only say of them: They did their work nobly and well. Peace to their ashes.

I must bring this "Bit of History" to a close. No one recognizes more than I how very incomplete it is; what a very little bit it is. I have dealt for the most part with the earlier days; which as I understand it is what was expected when I was asked to talk to you. He should be both a stronger man and better historian than I, who should undertake to write a complete history of this Society, and give exact weight and proper shading of color to each fact and factor that has contributed to the Society's growth and worth.

I am proud to have been one of the founders, and, during some of its earlier years, president, of a society that under its present able administration, stands as the largest, healthiest and most powerful for good of any similar society in America; and when I have said America I have said the world.



# The Florida State Horticultural Society; Its Past, Present and Future

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P. H. Rolfs

*Mr. President, Ladies and Gentlemen:*

The subject assigned to me is "The Horticultural Society, Its Past, Present and Future." That is a big contract, and I am not going to undertake it tonight. You have heard our Past-President, Mr. Taber, discuss just a little bit of it. There are four sorts of mountain peaks in the history of the Horticultural Society that come into my mind tonight that I would like to call to your attention.

The first was the cataloging of the fruits of Florida. Now, that is an easy matter for one who can go and copy the catalogs as we can do today. But let me promise you, it was no easy job about thirty years ago to get descriptions of unknown varieties and to catalog those varieties of fruits. It was the one big step that the horticulturists of the State needed to take at that time. We all know how it goes. After people have labored long and hard, after a piece of work has been done, it doesn't seem to amount to so much after all. That is the way we feel about the catalog. The catalog in its making was no small piece of work; and the catalog finished was a big piece of work for the development and progress of horticulture in Florida. I think,

therefore, that that may be considered as one of the big pieces of work that the Horticultural Society has done.

The second big piece of work was inaugurating and pushing forward the organization of the old Florida Fruit Exchange. The old Florida Fruit Exchange, when we look at it now, was a very imperfect and inefficient piece of machinery. However, it was the piece of machinery that gave California the ground work and the foundation upon which she could erect her Citrus Exchange, and we, in turn, organized ours. I hardly need to mention here that the Florida Fruit Exchange came to an untimely end by the disastrous colds of '94 and '95. However, the organization of the Exchange was an epoch-making occurrence in the horticulture, not only of Florida but of the United States.

None of us excepting those who went through the period can appreciate the third big achievement of the Horticultural Society and that was the rehabilitation of the citrus industry of Florida after the freezes of '94 and '95. We who met at Jacksonville were, for the most part, a rather gloomy set of people. We tried to smile and we did smile, but it was more of a grin. But we went at it determined to formulate

a plan and to work forward, and with the council and help of each other we succeeded in getting over those dark and trying days. But I want to tell you that if we were to go up against the same difficulties today, we would get over them with one-tenth of the difficulty that we encountered at that time. God forbid that we ever live to go through that again. I don't believe we will.

There is a fourth point I want to mention. It is rather near at hand and one of which we all should feel justly proud. It is not quite accomplished, but it really is so nearly done that we might say there is nothing left to do but the shouting. That is the eradication of citrus canker. You will remember how we met at Palatka. Members of the Experiment Station staff came and presented the situation to the Horticultural Society. I think it took about fifteen minutes to raise the necessary funds to send a man to look after the situation. Only a very short time after the members of the Horticultural Society had become fully aware of the situation, we had Mr. Stirling on the way to Dade county and started the first work toward the eradication of citrus canker. I don't believe that ten per cent of the horticulturists of Florida really appreciate the magnitude of this piece of work or the influ-

ence that it has had on the handling and controlling of plant diseases in the United States.

I remember quite well when Dr. Kellerman came to my office to talk over the whole situation. After discussing it for a considerable time, he held his head down and said, "Well now, Prof. Rolfs, honestly, as man to man, do you believe that citrus canker can be eradicated?" I said "Certainly it can and we are going to eradicate it, and we want you from the Department of Agriculture to come and help us do it." I said, "Now, Doctor Kellerman, your question implies a doubt as to the possibility of eradicating it." He said, "Well now, Professor, there has never a case happened in the past where a plant disease which has once become established has been eradicated." So you see that we have a new standard of work in the line of taking care of diseases, and the sum total of what the eradication of citrus canker has cost us, has not been as much as we would have had to lose annually, if the pest had been allowed to remain with us. Now I will close with that because I can always prophesy backwards better than I can forwards, and since I have been prophesying backwards I will not attempt the forward prophecy. I thank you.

## Address

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By H. G. Hastings, Atlanta, Ga.

*President Hume, Ladies and Gentlemen:*

I feel almost out of place at this anniversary meeting, because during the last twenty or twenty-one years I have been an absentee from the meetings of the Society. This has not been intentionally so, nor because of a lack of desire to meet with you, but simply the force of circumstances. I guess fully half a dozen times in that time I have packed and been ready to come when some unforeseen circumstance would prevent. One day last week I got a telegram from your present Secretary, Mr. Floyd, saying that this was going to be a sort of a "Home-Coming Week" for the Society, and asking me to shut up shop and come on. I did not have to shut up shop, but I did come on. It is certainly a very great pleasure to me to look into the faces of so many of the members of the Society who were active at the time of my service, and of those who might be termed the very necessary "new crop members," who gradually take the place of the older ones as they pass away. I did not prepare, and I am very glad I did not attempt to prepare, anything of a historical or statistical nature, because your former President, Mr. Taber, has done it so well.

My active connection with the Society as a member began in 1891. I

served as a Secretary from 1897, taking up an unexpired term of Mr. Arthur Manville and continuing until about the time I moved to Atlanta in the summer of 1899. I had no more idea of becoming Secretary of this Society than I had of flying before the days of airplanes. Mr. Manville, by the way, was the one member who, probably as much as any other, was responsible for the laying of the foundation of this Society. He was in very bad health. At the Orlando meeting he took me off to one side and said, "Mr. Hastings, I want to talk to you." He led me around to and we sat down on the steps of a church. It was some church about four or five blocks from the meeting place. He told me the condition of his health and said he would have to resign. He said, "you are about the only man that I can see in the Society that can well take up the work at this time." I was only a youngster twenty-three or twenty-four years old and I felt absolutely unfitted and told him so. But he said, "well, one reason that I think you ought to take it, Mr. Hastings (Mr. Taber was then President), is that there is a lot of correspondence in connection with the work, and you are the only one in this Society who has a stenographer and can write the letters." I don't re-



member the details after that, but I was flattered sufficiently to take on the job and did it to the best of my ability until I resigned at the time of my moving to Atlanta.

I do not know whether Mr. Taber will recall something that came to my mind today. I remember it pretty well. At one of the Orlando meetings, I have forgotten which one, we had a court stenographer from Jacksonville who was considered one of the best in the State, but who had apparently never reported anything of a horticultural nature involving technical or botanical names. Some sort of a discussion came up at the Orlando meeting about American and foreign varieties of grapes. Mr. LaMontaine, of Winter Park, Baron Von Lutichau, of Earlton, and a few others of those very technical gentlemen, got into a cross-fire discussion, using Latin names. The stenographer, before he got through, didn't know which end he was standing on and it kept him confused on the whole report. I think I was about three months in getting that stenographer's report straightened out, and I finally got the discussions only by re-writing them myself and then sending them on to each member on the program and having him re-write it, to really get what was said. It was a pretty tough proposition, but really amusing before we got through.

I am not going to take the time of this audience tonight, but I do want to say (and I can see it better as a non-resident of Florida, and possibly better than you who live here), Florida and you men that are engaged in horti-

culture today, owe a debt of gratitude to these men, many of whom Mr. Taber has mentioned. Many of those whose names are adorning the necrological reports of the Society through the years, many present on the platform and in this audience tonight have laid the foundation work by studying out the true lines of horticulture in Florida. I first came to Florida myself in 1884, just at the beginning of the citrus industry, and I might explain it in this way. The citrus industry, and it was hardly being thought of at that time as an industry, was an uncharted sea. Nobody knew anything about it except some of our native friends who used to have a few orange trees around the house that simply grew and furnished fruit. And one man's guess as to the way of pruning an orange tree and fertilizing it was as good as another's. The papers read from time to time before the meetings of this Society since then form what I might term a cyclopedia of Florida horticulture. Any of you who have a major part of the reports going back through the years, can trace by reading the reports of this Society the gradual steps that were taken to bring a certain amount of order out of the chaos that existed back in the late 80's and the early 90's.

Professor Rolfs, in speaking of that Jacksonville meeting which I believe he means was in the spring of 1895, stated that the members came there a pretty solemn sort of bunch, and we had a right to be. I don't believe there was ever a similar section that had to face such a loss as this section did in

the freeze of February, 1895, when almost everything was swept away. Many of them were broken financially, and out of that grew a physical and mental breakdown that undoubtedly killed many a member of this Society. But as I remember that meeting, in spite of the blow that looked almost irrecoverable, I felt there was a spirit of optimism in the meeting. We came there to see what the other fellow thought, and out of that meeting, with the bit of optimism that was present, there grew the impulse that has put the citrus industry on the basis that it is in Florida today; and I believe has put it on a wiser and saner basis than it ever was before. I believe the men who composed the Horticultural Society that day are primarily responsible and we living members owe them a debt of gratitude for the work which they so conscientiously, so whole-heartedly and so earnestly did. Of the Society from 1900 up to the present time, I have little or no knowledge except from friends visiting me in Atlanta and telling me of what you have been doing. I look over the reports as they come to my desk each year and hardly a day passes that I do not run through

the reports. In the list of members there are comparatively few of the old familiar names that I knew, and a very great many that are entirely new to me. I was talking with your Secretary, Mr. Floyd, today, asking him how many members we had. I think he told me something like 1500. At the time I was Secretary we thought we were getting along nicely when we had five hundred, and those were days when the railroads granted one cent a mile railroad fare and that was a great inducement in itself. And the fact that you see an audience like this in attendance here (I know I have met men here from all parts of the State), announces the fact that they are now willing and ready to recognize the value of this Society sufficiently to pay full fare both coming and going. It is certainly a compliment to this Society and, as I think Mr. Taber has said, one that you will hardly find in any other Society in the United States, or in the world.

As I said in the beginning, I want to express my gratification at being able to meet you face to face. I certainly hope it will not be as long a period before I can see you again.

# Address

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By E. L. Wartmann, Citra, Florida

Mr. President, I wish that these gentlemen who are talking about the freeze would stop it. If Mr. Hastings had not said that it cost the lives of a good many people in Florida I would be willing to say that the freeze was a good thing. I maintain that the freeze is worn out. I am not going to talk about the freeze. I am going to talk about the Plant Board, the Horticultural Society and what the Horticultural Society has done for the Plant Board. As a member of the Plant Board, I want to express my thanks to you tonight for your hearty co-operation and for standing behind us through this battle in fighting citrus canker.

I remember in 1913 when canker was first laid upon the table at the meeting of the Board of Control, it aroused my curiosity. It being found in the citrus belt, I had a feeling it was something that was probably very, very dangerous to the industry. It wasn't long until the Horticultural meeting was held. We heard from Dade county of the manner in which citrus canker was working in on their industry. In 1915 some who are present tonight were attending the sessions of the Legislature of Florida appealing to them to create a Plant Act, and to give them \$125,000 with which

to eradicate canker. I think it was some time in early May, during that session, that a resolution was passed by the Horticultural Society appealing to the Legislature to grant the request and to pass the bill. There was no more trouble after that for the \$125,000 came and also the bill creating the Plant Board.

We were given the task of eradicating citrus canker, something we knew nothing in the world about. At that time we didn't know that canker was a bacterial disease and something that could not be cured by spraying, and that the only way to control it was by burning. We found later on after we began to organize the work that we had to go to the Horticultural Society for help. The bill granted us the right to appoint and elect a Commissioner but we could not find a suitable man. We went to the Horticultural Society and gathered three men as an Advisory Committee who were to serve without pay and to help us organize and carry the work on.

Again, along in 1917, the Horticultural Society endorsed a bill giving \$300,000 of the taxes of the people of Florida to the Plant Board to aid in the eradication of citrus canker. Not only did it appeal to Florida, but it also appealed to the national government



which responded readily. In all, I, as a member of that Board, have helped to expend a little over \$1,100,000 of public money. You heard Mr. Hamner say a few minutes ago that the orange crop of Florida for this year alone was worth \$30,000,000. Wasn't that money well spent? As Prof. Rolfs has said, I believe that we have citrus canker practically eradicated from the State, something that has never been known in the world. The eradication of a disease, such as this which has attacked the citrus trees of Florida, has never before been accomplished. I want to say here in behalf of the State Plant Board, to the Horticultural Society, that we owe you a debt of gratitude. You have stood behind us and held up our arms when we were carried into the courts. You said "sit steady in the boat, boys, sit steady." We were carried into the courts, and we stood all kinds of abuse and criticism in some

sections of the State, but we have won. Citrus canker was found in twenty-two counties in Florida, and in four hundred and sixty-eight properties at one time, and tonight I stand here, believing that we have citrus canker practically eradicated, because we do not know of a single case in the State.

Gentlemen, I am doubly proud that you should come to Marion county. I want to correct the statement made by one of your officials that Marion county was out of the citrus belt; he is simply shouting to the moon when he says it, because Marion county developed the greatest orange known in history today—the Pineapple orange; and the next choicest—the Parson Brown, referred to by Mr. Hamner—originated in or near the edge of this county. I say that we are in the citrus belt and if you people will simply stop talking about the freeze and look around, you will find it out.

# Report of Committee on Fertilizers

Geo. V. Leonard, Chairman.

Mr. Hume: We are opening the program this morning by taking up the discussion of fertilizer subjects, and as this part of the program has been prepared by a committee, I am going to ask Mr. George V. Leonard, of Hastings, to take the chair and take charge of this portion of the program.

George V. Leonard: Ladies and Gentlemen: By a glance at your program you will see that there is a committee on fertilizers for this session, which is composed of Mr. C. H. Thompson, Dr. H. J. Wheeler and myself. Mr. Thompson and Dr. Wheeler have been unable to attend this meeting, therefore, the duty of representing the committee falls upon myself. The subject of fertilizers is a very broad one; it is a subject that the more we study, the more we are convinced of its magnitude. But this subject has been very ably treated from a great many of its different angles by different members of this Society in its previous meetings.

The members of this fertilizer committee were also members of another committee that met in Gainesville on Monday of this week for the purpose of establishing the feasibility of certain standards in fertilizer formulas. Many formulas are now listed as stock formulas by the different fertil-

izer companies of this State. It seems to your committee that there could be no more important subject brought to the attention of this Society than that of the standardization of these fertilizer formulas. And with this purpose in view, I am going to call upon Prof. Rolfs, who is chairman of the committee that met in Gainesville, to outline to you first, how this scheme originated, what its purpose is and what we expect to accomplish by it. I might also say that it would be well for him to tell us concerning the personnel of this committee and of their selection for this work.

You will note on the program that we have Dr. J. N. Harper, of Atlanta, Georgia, who will also address us on the important subject, "Standardization of Fertilizer Formulas," and I would suggest that after we have heard these addresses by Prof. Rolfs and Dr. Harper, we have a short discussion of the subject. Secretary Floyd has gently hinted to me that he has a very full program and a very fine one, and that one of his chief worries just now is to find time enough to do justice to the many important subjects before the series of meetings. Notwithstanding this and what our chairman told us last night, I believe they will give us a few minutes for discussion of this im-

portant subject after you have heard the addresses. Now, on behalf of this committee, I wish the Society to understand that we realize that this is a large question; it is an important question; it is a question that has great possibilities; and yet it has its limitations. But I believe that any favorable action taken on certain recommendations that Prof. Rolfs has to present to this body for your consideration, will be a great step in the right direction.

Prof. Rolfs: In March of this year, there was held at Gainesville, at the Agricultural College, what was known as a Fertilizer Salesmen's School. A large number of lecturers were there to address the fertilizer salesmen and to discuss the fertilizer question. It was not a shop talk, excepting that it was talk on fertilizers. Many of the addresses were identical with the addresses we have had before the Horticultural Society. Out of this grew and was centralized, the idea that we could standardize the fertilizer formulas for Florida and have a much smaller number of these offered on the market. A motion was passed asking me to appoint such a committee for Florida. After considering the matter somewhat at length, I asked the following gentlemen to serve on that committee:

Messrs. George V. Leonard; A. G. Hamlin; W. F. Miller; R. E. Rose; George B. Thomas; B. F. Floyd; R. W. Ruprecht; J. N. Harper, Atlanta, Georgia; S. C. Warner; Dr. H. J. Wheeler; Prof. A. E. Grantham; C. H. Thompson, and C. M. Berry. Of that list of people, Dr. Wheeler, Prof. Grantham, Mr. Thompson and Mr. C. M. Berry

were unable to attend. But you see we had a large representation and a rather full committee to meet with us on last Monday and discuss this whole question and consider the data that was before us. Different members of the committee took up different phases of the question. Mr. W. F. Miller, for instance, took up the question of fertilizers that were offered on the Florida market, and he had a pack of manuscript about so deep, showing that he had considered every fertilizer formula that was offered on the market in December, and it shows that there were 101 fertilizer formulas offered to the Florida market. I will not go through or attempt to show how we digested this material and what data we had to consider. Captain Rose corresponded with other State chemists and brought that information to us; and we had with us men who were used to mixing commercial fertilizers. Now I believe I have that matter pretty clearly stated and when we hear from other members of this committee, the question will be before us in a fairly rounded state. The committee adopted the following recommendations:

Gainesville, Florida, May 3, 1920.

The committee appointed on Standardization of Fertilizer Formulas met in the Experiment Station building at Gainesville Florida, continuing their deliberations in the forenoon and afternoon of May 3. After examining large amounts of records and data, we beg to make the following recommendations:



1. That standard complete fertilizers in Florida shall be made of the following formulas:

Ammonia	Phos. Acid	Potash
0	10	4
2	10	3
3	10	2
3	8	3
3	9	3
3	6	5
3	8	5
4	8	2
4	9	2
4	6	3
4	7	3
4	8	3
4	8	4
4	6	5
4	7	5
4	6	8
4	5	6
5	8	0
5	7	2
5	6	3
5	8	3
5	6	4

2. That no standard brand be made to contain fractional percentages of plant food.

3. That in stating percentages of ammonia it shall be stated in proportion of the water soluble, nitric nitrogen and organic nitrogen.

4. That we recommend the following combinations for ammonias with reasonable tolerances:

First, one hundred per cent water soluble;

Second, seventy-five per cent water soluble, twenty-five per cent organic;

Third, fifty per cent water soluble, fifty per cent organic;

Fourth, twenty-five per cent water soluble, seventy-five per cent organic;

Fifth, one hundred per cent organic.

5. That the Horticultural Society recommend that the necessary additional analysts be provided by legislative appropriations from funds accruing from the fertilizer tag tax.

By the committee,

P. H. Rolfs, Chairman,

Geo. V. Leonard,

A. G. Hamlin,

W. F. Miller,

Geo. P. Thomas,

B. F. Floyd,

R. W. Ruprecht,

R. E. Rose.

J. N. Harper,

S. C. Warner,

Mr. Leonard: Before we go into an open discussion on this subject, we have with us Dr. J. N. Harper, of Atlanta, who will also discuss the subject, "The Standardization of Fertilizer Formulas."

# Standardization of Fertilizer Formulas

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J. N. Harper, Soil Improvement Committee, Atlanta, Georgia

I am going to make my talk very brief and I hope to the point. The question for consideration is whether or not we shall cut down the great number of formulas we are using here in Florida. I have been interested in this question for some time. While I was Director of the South Carolina Experiment Station I made an effort to reduce the great number of fertilizer formulas used in this State, realizing that the manufacture of such a great number necessarily meant greater cost of the fertilizers.

Now let us consider how it happened that we have such a great number of fertilizer formulas? When this country first started to use commercial plant food, it relied upon Peruvian guano. The composition of that material ran very high in nitrogen. In those early days the cotton planters of South Carolina found they could not use more than two or three hundred pounds of Peruvian guano, because when they used more it simply made a big weed and less cotton; in other words, it was not a well balanced fertilizer. Then after they came to use acid phosphate, they found they could use far more fertilizer than they had been using in the form of Peruvian guano, and with much better results.

This was the beginning of fertilizer experimenting; the farmer had no experiment station results to guide him. He conducted his own tests. The fertilizer that gave the best results in the community thus came to be the kind of fertilizer desired, and as a consequence the number of formulas became as numerous as local tests.

If all our soils in Florida were of the same type, and all plants used the same proportions of each plant food, that is of nitrogen, phosphoric acid and potash, one formula would meet all requirements, but we have a diversity of soil types and we know that different plants require different proportions of phosphoric acid, nitrogen and potash. We know, for instance, that tobacco requires more potash than cotton; that cotton requires more potash than corn; that the leguminous crops require more potash than grasses. We know that we cannot put the same fertilizer on oranges that we use on okra, beans, and some other crops.

Just why crops require more phosphoric acid than nitrogen or potash, we are unable to say; we know that it is a fact. It may be because the soil does something to the phosphoric acid after it is applied. The phosphoric acid may be chemically fixed in the soil, or it may be that the plant has not the power to absorb the same quantity

of phosphoric acid that it has for absorbing nitrogen or potash; or, it may be that the phosphoric acid is not as well distributed or diffused throughout the soil as nitrogen and potash. We know that the nitrogen passes up and down with the capillary movement of soil water. We do not get the same movement with phosphoric acid.

Over the South as a whole, on the Norfolk sandy loam, Orangeburg and coastal plain soils of any type, practical experience has taught us, as well as the tests of our Experiment Stations, that with a few exceptions, we need more phosphoric acid than potash.

We know accurately the amount of plant food removed by a crop of oranges, sweet potatoes or any other plant. This the chemists can determine by analyzing the plants and fruit, but that information does not tell us the amount of fertilizer that should be used, or the proportions of nitrogen, phosphoric acid and potash that should be put into fertilizer. One reason, as we have indicated, is that the soil does something to the fertilizer, and another reason, is that some plants have a stronger feeding power for certain elements of plant food than others.

To suit the varying crop and soil requirements, of course, we must have a varying form of fertilizer. We want a fertilizer running low to high in phosphoric acid, from low to high in nitrogen, and from low to high in potash. We want different combinations in highs and lows and intermediates of the three plant foods, in that we want

every combination that the soils and crops require.

A committee, appointed by Prof. P. H. Rolfs, Director of the Experiment Station, has considered this question fully. We went into it as far as we were able to study the requirements of every crop, and as far as we know in what proportions these elements should go into fertilizer, and in so far as the practise of orchardists and farmers reveal. We found that twenty-one or twenty-two formulas were all that were needed, and we have these on this chart. They are as follows:

Ammonia Per Cent	Phos. Acid Per Cent	Potash Per Cent
0	10	4
2	10	3
3	10	2
3	8	3
3	9	3
3	6	5
3	8	5
4	8	2
4	9	2
4	6	3
4	7	3
4	8	3
4	8	4
4	6	5
4	7	5
4	6	8
4	5	6
5	8	0
5	7	2
5	6	3
5	8	3
5	6	4



Now, it would certainly be a great saving if we could get our growers and fertilizer manufacturers to adopt these standards. Among these formulas there is a fertilizer that would suit any crop, on any soil that we have here in Florida; that is, as far as we know.

We figured out a graduated scale for these different formulas and then we compared the formulas that we have used in this State with those you see charted here. We thrashed it out and finally agreed to recommend these to your Society.

We must remember this. It is impossible for any one to establish a formula and say it is the one for him to use year in and year out. We know, for instance, that after a wet winter we have to use a higher percentage of nitrogen in our fertilizer than after a dry one.

The Florida Experiment Station has shown that practically none of the phosphoric acid leaches out of the soil, because it is fixed there. It is fixed by combining with lime, iron or aluminum and in these forms is insoluble, but it can be expected to gradually become available again.

Let us suppose that you have been using a 3-8-5 and after some years you find out that your soil has accumulated considerable phosphoric acid. Some would say that you could get along without phosphoric acid for a year or two, but that is not good advice. You want to maintain your high yields, and perhaps you could do so by changing your formula to a 3-6-5 for a year or two and then go back to a 3-8-5. This same thing might be

done with potash. Potash is not fixed in the soil like phosphoric acid but is held there much better than nitrogen. You know that nitrogen, especially in the nitrate form, is soluble and will wash out of the soil, while potash, though soluble, can be held by the soil. German propaganda induced our farmers to use a high percentage of potash before the world war, and as a consequence we had a large amount stored up which helped us over the lean years when we could not get it. In South Carolina I saw cabbage that had gone to pieces for lack of potash, yet the cabbage had not suffered until the potash had been left off for three or four years. The reason the cabbage had not suffered before was due to the fact that the grower had been applying more potash than the crops had needed.

If we have been using a 3-8-5, and we find that after a while the potash has accumulated in the soil, and we feel that we can reduce the amount for a year or two, we can drop from a 3-8-5 to a 3-8-4 or even to a 3-8-2 or less, then after a year or two go back to the original formula.

On the chart we show a range that I believe would suit all requirements of crops and soils, and I would certainly back up the committee in its recommendations that this Society advise the farmers, fruit growers, and especially the fertilizer people, that they adopt this plan. It will mean much to our people and a vast improvement to the crops.

Now as to availability. One point on that and I will be through. Nobody can tell just what percentage of the am-

monia or nitrogen in his fertilizer should come from an organic and an inorganic source. We know that under certain conditions you cannot depend entirely on nitrate of soda; we know that certain crops respond well to certain sources of ammonia and not so well to others.

The main point about selecting the sources of nitrogen is to find the kind that a particular crop prefers. If it is a mineral nitrogen that is readily available and inclined to act quickly, then apply a part of it at one time, and as often during the period of cultivation as the plant requires. As a rule we are only adding to the cost of fertilizers by specifying a large variety of materials, just as we add to it by requiring numerous formulas.

Mr. Leonard: The Society is due a little further discussion on this subject. I believe you will all be interested in having two or three of the members of this committee express themselves on this subject, stating why they wish to present these recommendations for your consideration, and in this connection, I am going to call upon Judge Hamlin, of DeLand, to speak a few words on this subject.

Judge A. G. Hamlin: This is very sudden. I do not know anything about this address. I do not know very much that can be added to this. We are all cranks on some subjects and I have been a little cranky on some. I have been very anxious for a long while to have the sources of fertilizer stated more specifically on the tags. It does not tell us anything, for instance, if we get a tag saying that the ammonia con-

tent is 4 per cent, 5 per cent, or 6 per cent; or that it is derived from nitrate of soda, sulphate of ammonia, bone, blood and bone, tobacco and a half a dozen other things. What do we know about it? We don't know anything about it. So I have been, in my cranky way, advocating for some time among the fertilizer men and in the Citrus Exchange, some sort of standard. I want it enacted into a law, if necessary to make it more specific.

Now we all know that we might get a fertilizer that would comply with the law in its statement of its ammonia content and the sources from which it was derived. Now nearly every bit of that might be from the cheapest source. I think that fertilizer men who are here will tell you, if you ask them and press the question, that ammonia can be purchased at different prices per unit, from \$2.00 or \$3.00 per unit up to \$9.00 and they are worth agriculturally just about what they cost. Now what is the trouble? I am not supposing there are any such concerns in the State, but we have to compete with some out of the State. What is to prevent some concern that wants to make a lot of money putting in a cheap source of ammonia? We don't know anything about that, but they say it is derived from various sources. Now, there might be a handful of different sources put in and all the rest be the very cheapest stuff they can get.

Now I want to head that off, and I presume that I am a strong advocate of the provision requiring that the amounts be named specifically. I want the number of pounds, now that is my



crude idea. I have been putting fertilizer on oranges since '79, and I have wanted to know what I was putting on. I didn't want to put on a fertilizer in the summer in which all of the nitrogen or ammonia was derived from nitrate of soda, because we might have a rainfall of two or three inches and our trees would not do anything; the trees would look starved, and not put on proper growth. I fertilize well, but I am somewhat cranky about my fertilizers.

I raised the point before this committee and tried to have incorporated in its report a provision requiring a statement on the tag of the number of pounds of the source or sources from which the ammonia is derived as well as the other elements. The scientific gentlemen showed to me very conclusively that this could not be done. It would make too much work for the chemists, too much expense in analyses and that has to be done. Therefore the following substitute was suggested by them:

"That we recommend the following combinations for ammonias with reasonable tolerances:

"First, one hundred per cent water soluble;

"Second, seventy-five per cent water soluble, twenty-five per cent organic;

"Third, fifty per cent water soluble, fifty per cent organic;

"Fourth, twenty-five per cent water soluble, seventy-five per cent organic;

"Fifth, one hundred per cent organic."

They tell us that that absolutely shows to us the percentages and does

not necessarily add much burden to the manufacturer. Now there are some things you know that the common herd of us have to take for granted. And after very careful study I think I can figure out for myself, if that is on my tag or certificate, about what I am getting and about the different sources. It is not accurate, but with reasonable tolerances (we put that in so that there may be some variation allowed), we can tell from the tag how much we are getting of nitrate of soda, or sulphate of ammonia or of organic matter, and we can regulate it ourselves accordingly. Different concerns and county agents are familiar with that and they can tell you all about it. I want to get something that will educate the people, that will give us better knowledge so that we won't be subject to the slick tongues of the fellows that sell fertilizer. They are good fellows; they are all right in their way; but they want to sell. Now, for instance, I have a neighbor now living just across the street from me and who does not know anything about horticulture. She has an orange grove and the other day she called me over to prescribe for her. She said, "what do I need? My husband, when he was alive, used to talk to you about what he ought to put on." I saw from the looks of her trees that they lacked ammonia; that they were being starved. And I knew as a matter of fact that they had been fertilized with nitrate of soda in the wet season. Now sulphate of ammonia and other sources do not require another application so soon. We can't all guess at the weath-



er; we are liable to make mistakes. But we can approximate it because we know that in the summer time or in certain seasons of the year, we may expect rain and we naturally wouldn't depend wholly on nitrate of soda at that time of year because the plant food would be washed entirely away from the roots.

Now, if there are any who can not understand this proposition, I would suggest we get back to the philosophy of the negro school teacher. He had a lot of colored boys and girls and they were likely to ask questions just like white boys and girls. And one boy held up his hand and says, "Professor, can you tell me why that sometimes the tide is out, sometimes the tide is way in, and that goes more so when de moon am full." Now that was a stumping question. He says, "Honey, there are some things that can be only answered in Latin. Now I'se gwine to tell you now, Alboniced de facto, de pluribus unum omnibus, dat's de reason, honey, but youse too young to understand."

Now I suggest that these men who have worked this thing out tell you. We can't be any worse off than we are.

Mr. Leonard: I expect our President and Secretary are very glad that I did not let him know he had to speak. He has covered this subject very well, I think. I would like to ask Mr. S. C. Warner if he will deliver his views on this subject.

Mr. Warner: It seems to me the ground has been so well covered that there isn't much of anything I can add.

Of course, a great many of us have had a satisfactory formula that we thought perhaps better than anything else and it does not appear on this list; but we attempted to make up combinations that would really suit the requirements of everyone, and I rather think it has been accomplished. No doubt there will be a good deal of discussion and the more time we have for that discussion the better. Perhaps it might be possible that someone can suggest a formula that would fit into the list.

Mr. W. F. Miller: We are all interested in reducing the high cost of living. Every time the fertilizer manufacturer is called upon by the farmer or the grower to make a certain fertilizer formula it costs a certain amount of money. This formula must be registered with the State Department of Agriculture, the tags must be printed, and other minor expenses added to the cost of making this special formula for your land. He may have to stop three or four times a day to clean out the bins to make a new mixture. That all adds to the cost of producing fertilizer, and eventually the man who uses this fertilizer pays that cost. As Dr. Rolfs has said, on December 1 the fertilizer concerns of the State were furnishing and had listed no less than 101 different formulas, and of certain formulas they had perhaps six or eight different mixtures of a particular formula made of different materials. This committee decided, with the idea of economy and reducing the number of formulas, to try to eliminate the fractional formulas. We took, for in-

stance, a 3-6-5 formula. We found that perhaps ten different fertilizer concerns in the State were making that formula. Now it has been proved by the use of that, it was a good formula. The farmer had helped to evolve that formula. We thought it was a good one for a standard mixture. If we found one formula made by only one concern and we found that it was not largely used, we eliminated it and we studied the formulas most largely used, in the State and found, as stated by Dr. Harper, that twenty-two formulas can give the grower any desired mixture he wants. I have not touched on the source of plant food. If a grower wants all nitrate of soda, or all blood and bone, or tankage, he can get that material and a certain per cent of ammonia, phosphoric acid and potash. This committee has not attempted to discuss the materials that should be applied in these formulas, simply the percentage of plant food. The entire southern country is working along this line. I think Florida will be the first State in the South, if she applies this plan, to adopt a standard formula of certain percentages of ingredients and I certainly hope that the Society at this morning's session will approve the action of this committee. We have had growers and chemists from all over the State on this committee and spent one whole day in working it out. The idea was to reduce the cost of fertilizer and eliminate this overhead and when we do that we will have made a start in bringing down the high cost of living.

Mr. Leonard: We are taking up considerable time with this subject and now I think in behalf of this Society I should thank Prof. Rolfs and his committee for presenting us with this work. I believe it would be fitting now before we go into any further discussion for me to turn this meeting over to our President.

Mr. Hume: You have heard the discussions and the explanations of the work of this committee. What is your further wish in regard to it?

It was moved and seconded that the recommendations of the Fertilizer Committee be adopted.

Mr. Yothers: Please read the resolutions again.

Resolutions read by Prof. Rolfs.

Prof. Rolfs: Mr. Chairman, may I have a word in connection with this? It is a question that has been up in our minds for years as to how a lot of this overhead, unnecessary, and annoying situation could be eliminated from the market; eliminated from our work; and it seems to me that this is a step in the right direction. I have studied the situation closely and have known of it for years, but it never came to me so acutely as it did during the last period of the war when we were striving with might and main to conserve every bit of energy that could be conserved. And with all, we wasted a lot of time and money in having a multiplicity of formulas on the market. As Mr. Miller has pointed out, of the 101 formulas on the market you will see that twenty-nine of them contained frac-



tional percentages of plant food. Now plants will never know the difference; we cannot get feeding down to so close a science because nobody can control the winds and the rains, and the sunshine, and so long as we have these varying factors in our plant growth we need not talk about fractional percentages of plant food.

We can't predict—even when we have fifty years of data before us—what the weather is going to be next month with enough certainty to make it valuable in connection with the question I am discussing. So it seems to me that if we adopt something of this kind it will be of greater service to the users of fertilizer. Now the fertilizer companies would like to reduce the number because it will help them; but no fertilizer company likes to print a sales sheet and show twenty formulas as the whole range of their fertilizers, when their competitors are putting up fifty and seventy-five. It looks as though they were poverty stricken. But the users of fertilizer are not benefitted in the least by that large range and multiplicity of formulas. As Prof. Harper has shown us by those charts, and if you had time, as we had on Monday, to use a whole day, meeting at ten and adjourning at five, you could have seen that any formula that you might mention that is of any service to you in the State will fall right into this scheme that we have. However, we got this scheme out by elimination and preferences of the formulas in the State.

Mr. Hume: Prof. Rolfs, before you take your seat for the direction of the officers of the Society, I would like to ask one question; to whom are these resolutions addressed?

Prof. Rolfs: To the Horticultural Society.

Mr. Hume: And what is the further action of the Horticultural Society in relation to the matter?

Prof. Rolfs: If it accepts these, then it is our recommendation that these be used and that the Horticultural Society recommend that these resolutions be adopted. The Society does not bind itself any further than to recommend that they be adopted. It can't compel anybody to do this; it is merely a matter, ladies and gentlemen, of an educational matter. If you had worked over these formulas as we have I am convinced that you would have come to the same conclusion that we have come to, and it is simply a matter of getting this before the horticulturists of the State and calling their attention to it, getting them to study it. Now I think that is the question.

Cap. Rose: Mr. President, there is one thing more to be discussed, and that was the suggestion that this matter has to be adopted by the Society and handed down to the Legislative Committee. There is some legislation needed. Then there is going to be some extra expense.

Mr. Hume: That is what I was getting at. There is more than appears on the surface at a cursory glance, there



are some things that I doubt if Captain Rose has the authority to put into effect. He said it would be necessary to attempt at least to amend that law and I think the Society ought to have their say in connection with it.

Mr. Skinner: I think these men have gone only a short ways and I think it ought to go farther. Now potash there seems to receive very little attention as to its source and to my mind the greatest danger in the fertilizer situation today, is the source of potash. I notice the fertilizer journals are very proud of the fact that a considerable amount of the domestic potash has a smaller or larger amount of borax. Now I used some domestic potash and the year before and the year before that. I had considerable leaf damage and twig damage in one of my grapefruit groves where a considerable amount of that potash was used. I ascribed it largely to spraying and submitted it to the spray experts and the spray people said no, and by the process of elimination I am finally convinced in my own mind that it is the borax in the potash that did the damage; and I find that the experiments that have been conducted on that line are to the effect that a very small percentage of borax in sandy soils in dry weather will do a great deal of damage.

Now it seems to me if we are going to ask for a certain source of ammonia, organic or mineral, we should also ask for the source of potash, whether it should be sulphate or whether it should be muriate or just what the source is.

I think it is a very vital thing and I think that this is the matter in the coanut and if we get any legislation that is where we get the benefit from. And I think it essential also that we have additional chemists if we are going to get any benefit out of our fertilizer department in the State. I have attempted to use the fertilizer department of the State, but they evidently do not have sufficient chemists to do the work. If we are going to get any good out of that department at all, it must be fully equipped, and if this goes to the Legislative Committee, I hope it is adopted, and we will get something real out of it, and not just discussion.

Capt. Rose: I am very glad to have Mr. Skinner bring the subject up. That question of borax has been rather a sore one in the State, not only the State, but throughout the union. It has resulted in legislation, and in some instances regulation under the law. I think that your Legislative Committee should consider that matter particularly with the necessary data before them which I should be very pleased to send them, and that borax, like chlorine, should be stated upon the label, so that the guarantee of the manufacturer will show that his goods contain only a certain percentage of borax. It is still a question as to the damage that may or may not be gotten from borax. I do not think that there is a preponderance of evidence that it has been damaging.

Mr. Hume: Is it not true also that we have been having lots of borax the last few years in our formulas?

Capt Rose: Yes, and borax has not come altogether from a potash source. We have had borax in formulas made from the Chilean nitrate. Now they are eliminating borax from these sources, and when it was discovered that the borax was damaging, the sales stopped. Some of our domestic potash has practically none; the borax content being less than one-fourth of one per cent.

Mr. Hamlin: I believe Congress has tried to pass a law to that effect.

Capt. Rose: I do not think Congress has passed such a law, but under the general laws the regulations adopted by the Federal Board are law. Our State Plant Board has the right to make regulations that become law, but our fertilizer law does not give us that authority.

I am glad also to have Mr. Skinner recommend that we provide a larger analytical force. I have been asking the legislature for years for more help.

The work has accumulated wonderfully and the income is about \$60,000 or more per annum than the expenses of the department. Now that money is paid by the farmer and should go to his benefit.

Mr. Hume: I think I had better bring this discussion to a close, because we want to adjourn not later than 12 o'clock. All those in favor that these resolutions be adopted signify by saying aye; contrary, no. The ayes have it.

Mr. Hume: The resolutions have been passed by unanimous vote.

Mr. Hamlin: Now I would ask if it is not necessary to make the motion that this matter be referred to the Legislative Committee. If this motion is in order I will make it.

The motion that this matter be referred to the Legislative Committee of the Horticultural Society with power to act was seconded and passed.

# Implements for Use in a Citrus Grove

J. G. Grossenbacher, Apopka.

I was certainly glad to listen to the report given by the Committee on Fertilizers. I am sorry that the Committee on Grove Machinery has not had a similar opportunity for the preparation of a report. We have followed, I believe, the usual custom in having different members of the committee undertake certain portions of the report, without a conference to start with. From the results and discussions of the fertilizer committee you can readily see how the different members, or rather the different committees of the association, could be of much more benefit to you and the Society in general, if they could have beforehand a meeting at which their reports are unified and discussed.

The Committee on Grove Machinery has had to divide its work as usual. There is one member discussing tractors; another one spray machinery; another one the use of tractors in regard to irrigation, running pumps, etc., and it is my lot to discuss the balance.

Well, I am not going to do all that, but I have decided that probably it would be best to take such a heading as grove implements including machines and implements drawn by teams or tractors, such as plows, harrows, cultivators, mowers and perhaps fertilizer spreaders or drills. These I

take it, are the most important machines that are required in the building and maintenance of the grove. In some groves, by the way, you will find nothing used but a plow and a drag or Acme harrow; and in others more equipment is added. Perhaps in more of them in addition to the plow and drag harrow, you have the disc or cut-away harrow; in others, spray machinery and mowers, and in some of them a hay rake.

Now in regard to the cultivating tools, I am rather inclined to believe that we are too slow to eliminate or substitute for the one mule equipment, larger equipment. The grain farmers of the northwest have gone through this period years ago. The two-horse plow and harrow have long since passed, even long before the tractor became any factor in grove work, and it is surprising to see in how many large groves in Florida you will see the one mule equipment in operation, and two mules for the usual equipment. Labor is high, mules are costly, and so is mule feed; but at the same time economy would say that we should use larger tools instead of two-mule harrows. In most of the large groves they will operate and do more and better work than the small tools. For instance, take as an illustration the one-



horse disc. The one-horse disc in a grove is practically worthless because it is too unsteady. The least little thing will jostle it to one side, and then it jumps over to the other side. When it comes to a disc or cutaway harrow, the larger it is the more work it will do. Now, with the drag or Acme type, they do practically the same; you want stability in that tool. Along with the increase in size, you will necessarily have to have some regulatory feature in regard to the depth of tillage and some provision must be made for the operator to ride. It is better to have this implement with wheels regulating the depth of tillage as well as carrying any load. You know, at the present time most of us have one or two-horse Acme harrows dragging on the ground. When it is soft they will go in deep, and when it is hard they slide on top.

Of course, there are some one-horse tools that you must use in any grove. I would say, for instance, in regard to Bermuda grass and maiden cane, I do not believe there is any better tool than the one-horse five-shovel cultivator to snuff it out. We may get larger tools after a time that will do better, but at the present time it is best, so at present we will have to have some one-horse tools or implements.

Now increasing the size of the implement also means that the ground must be cleared, without stumps and large roots, because those will play havoc with a large implement. Another thing you can't have enormous quantities of dead vegetation on your land and use these large implements. They will clog too

easily and are hard to unclog. The larger the implement, the harder to unclog, so that means a change in that respect. Of course, that is easily eliminated by the frequent use of a mower in late summer, so that when fall comes and you are ready for cultivation, you will not have such an enormous pile to handle. As it is cut two or three times during the summer the amount will be greatly reduced in the fall.

In regard to the hay rake, I should say it should not be used in a grove except when it is used to rake up dead Bermuda grass that has been pulled up and is to be hauled out. In most sand-hill groves the cover crop that grows on the land should be left on it. It is worth more there than it is for hay. Of course, there may be some lands, probably, where no damage is done by the removal of the cover crop.

I mention another implement which is very scarce in Florida, and which I believe would be of some value here, and that is a drill or fertilizer spreader to put in fertilizer. Perhaps three-fourths of the fertilizer is applied by hand out of a bucket or by shovels out of wagon beds. Those methods are slow; they are inaccurate, and irregular. You get careless help handling such distribution, and the distribution is very poor, and your trees will have a pile dumped here and a pile dumped there, but there is no uniformity in the distribution of fertilizer. Now the way to get uniformity there is to use fertilizer spreaders; they simply broadcast the manure on the ground and work it in. If you have attached behind, implements to cover the fertilizer,

such as the drag harrow, that is making some progress. But it would be better if instead of that, you would not broadcast the fertilizer, but actually place it three inches deep in the ground by a drill, such as a disc drill, for instance. Some three years ago I took up this matter with a drill manufacturer that has made such a drill for California. The California drill, by the way, is very good, excepting that it does not fit in Florida. The drills are made by hoes instead of discs, so that in grass, either loose or attached, those hoes would be troublesome; they would clog; and it had wooden pegs in it like the grain drills of the northwest, so if they hit a stump, the pegs would be broken and a careless driver would drive along with a broken peg quite often. Now to obviate this difficulty a disc is more practical because it jumps over obstacles. The California drill has another difficulty, and that is that the rate of fertilizer feeding is too slow; we need a drill in Florida that will put a large amount of fertilizer in a small space and with

the California drill you cannot put much in without repeating your operation frequently.

Now as to the advantages of a drill, in addition to those mentioned; in the first place you have regularity of distribution at a certain depth. That necessarily means that the feeding roots in going for the fertilizer, or going in the direction of the fertilizer, will not come to the surface so much as they do when the fertilizer is at the surface, as it is usually when put in with an Acme harrow or ordinary surface drag harrow. We know that in the fall we often see groves looking yellow. They have had a good deal of fertilizer, but much is wasted from surface application. Another thing, it being on the surface has rather encouraged the development of roots upward during rainy seasons. Many of the fine feeders are killed by drought because the surface sand is perfectly dry at such times. These roots are out of the business and fertilizer in that upper layer is out of business, consequently the trees become yellow.

# Types of Spraying Machinery for Use in the Citrus Grove

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R. E. Lenfest, Florida Citrus Exchange, Winter Park

In taking up this subject, I have started with a very small unit and worked up to the largest type, dividing the sprayers into two general classes—hand sprayers and power sprayers. Hand sprayers include the little atomizer or “pump gun,” the knapsack sprayer, the bucket sprayer and the compressed air sprayer. Power sprayers include the wheel type and the roller type. Of the wheel type there are two sub-divisions, the compressed air and the ordinary pump.

Of the hand sprayers, the atomizer type has a very limited use, being employed only by the man with very few trees and those trees small. The knapsack sprayer is practical on moderate sized trees, but it is necessary to have a man who is somewhat ambidextrous so that he can run the pump with one hand and the rod with the other, and in pumping he must remember the pump and squirt down and then remember the nozzle; the pressure will run out and he gets pressure one time and not at another and so it goes.

The compressed air sprayers give a steadier pressure than the knapsack sprayers and, therefore, will do more effective work. When the compressed

air sprayers are sent out from the factory, they are without exception nearly, if not absolutely, worthless as sprayers. They put on a little piece of hose about three feet long, fastened to an eighteen-inch length of small pipe, on the end of which is a little straight nozzle that shoots straight out. The cut-off valve is either back on the tank or combined with the nozzle. We figure it out that it happens in this way in putting out lots of machinery, sprayers and other things, a few of the inventors will get together, hunt up a blacksmith and they will build a machine. If it will squirt it is a sprayer. But if you will do as I have done and as I have seen others do, take everything off of the sprayer and build it over again, you can make a very practical tool of it. Put on four or five feet of a light flexible spray hose and then a light rod, four to six feet long, according to the size of the tree you want to handle. Then, if it is the type that has a cutoff on the tank, take a wire and tie the valve open. Then take an ordinary cutoff and put it in between the end of the hose and the rod. Use an angle nozzle on the rod. When you have the pressure up, the thing hangs over your shoulder like the knapsack sprayer, etc., with the ad-



vantage that you have two hands to work with.

The barrel type is the old standby and if the hose, rods and nozzles are all right, the main thing to look for is to have the pump work easily. Now those of you who have used one, as I have, know it is impossible to have it work easy, but some work easier than others. After you have found that you have an easy working pump, make sure that the valves are positive and quick in their action. Then take a look at the thing before you buy it, and see whether or not you can get at it to repair it or put in valves or fix the pump.

We will take up power sprayers of the wheel type next, and under this heading comes the compressed air sprayer. Once pressure is up, they give a pretty steady stream, but it takes some time to get up pressure, but, like the hand sprayers, they lack volume and they also lack pressure; and to cover the ground economically one must have power and pressure. In regard to the engine, it may be of any type, but it has to work all the time, and an engine working all the time with a heavy load with no rest period will get hot. On a compressed air sprayer, when not overloaded, they make a good power unit.

In the ordinary power sprayer there are three main units, the tank, the engine or pump and the truck or method of carrying it around. The tank should be of convenient size, sound, water tight, fitted with strainers and either having an agitator or not just as you choose. Some grove owners prefer agitation and some do not; with some

sprays now on the market, agitation is not absolutely essential. The wheels should be large in diameter, have wide tires, and be strong. The truck should also have fairly short turning range, because sometimes one gets into a corner and goes farther than he intends, and if you cannot turn short, you almost have to take the thing down to get out. I had an experience of this kind in a grove with which I was not familiar and came to a very narrow corner, a sharp angle, and could not back out. I just happened to have a truck that would turn very short. I got down and found where I was and turned around a tree and got out. With some trucks that I have seen this could not have been done.

These foregoing requirements for the truck are met in the roller type. They are not as troublesome in some ways, inasmuch as they have a large diameter and a large surface on the ground and thus pull easily. A general principle that should be true of all power sprayers is that they should be built with no projections to catch or pull off anything that may be in the road. I will discuss the pump last, because it is really the thing that does the work about the sprayer. The engine should be of standard make, so that you can get repair parts easily, for many applications of spray have been lost because of not being able to get repair parts. It should also have the working parts closed as far as possible to keep them from getting covered with sand.

The pump should get up pressure quickly and hold it; it ought to hold the pressure day in and day out

throughout the season. Now some of you are smiling, which seems to indicate that you have had some trouble there. I guess pretty nearly every spray man has had trouble at one time or another with pressure going down. But if the pump is a good one of a standard make and all right, the pressure should be maintained. And here again I repeat that all parts should be easy of access.

The valves should be so located that they can be removed easily and the plungers or any other part of the pump should also be easy to reach. The valves themselves are very important parts of a spray pump and are of two general types, the ball valve and the poppet valve. The ball valve works very fast; it is very positive but at the same time it works fast, it also wears fast. It has a heavy weight and will pound the seat out in a short time. The poppet valve works a little slower, although there is one on the market that is so constructed that it works faster than the ordinary poppet valve. In most of the spraying solutions the poppet valve will wear longer than the ball valve, but for some other solutions this is not true.

One word about hose and nozzles. The hose should be strong and able to hold the pressure day in and day out. Don't get a heavy hose, get as light a hose as you can that will hold the pressure, because if you have a heavy hose to carry around your men will get tired out before the morning is over and will work slower the rest of the day. I know that is so because I have been at that end of the game and have

had to handle fifty foot length of hose, double wire wrapped (one layer of cross-braided wire wrapped with larger wire around that). The hose itself was very heavy and it was just like dragging a log around with you all the time. That hose is still lying up in the barn. It has been thrown out and not used since.

The rods should be straight and well balanced, they should not be too small. I have had arguments with growers who believed that they should use a one-quarter-inch pipe for rods and also bend the rod back so it would bend down all the time. Now that will work fine when it is only a matter of spraying the under side of the leaves, but that small rod would soon have your fingers cramped and become tiresome to hold. One man got away from that by using a bamboo rod and tying it around one end of the spray rod, using a quarter-inch pipe. But that is rather heavy and a rod out of balance and heavy, wastes the time and energy of the rod man.

The nozzle should be of the angle type always and should throw a wide spray, reaching out as far as it can, and if the pump has pressure enough and volume enough to carry it, put a "Y" on the end of the two rods and then always keep close watch on your disc openings. I have been called out many times as County Agent to look at machines out of order. Once I made a trip about eight miles into the country to look over a machine supposed to be the best on the market but which was apparently not any good. It would not hold up pressure and after looking it



over I found it to be all right; there was nothing the matter at all. I stopped the machine and looked at the nozzles, and in one there was an opening one-eighth of an inch across and in the other, a little less. Of course he couldn't keep up pressure because the pump could not supply enough liquid to carry the nozzles and keep up the pressure. The discs will wear out rapidly, and if the openings get too large just throw them away and put in new ones.

The last thing is the cut-off, on the end of the pump discharge line and at the end of the rods. The ball cut-off is the most positive and the best wearing cut-off to get. The ordinary cut-off, simply turning round and round in its socket will work fine for a time, but soon it gets to leaking around the valve stem or lets the solutions out of the nozzle, so I would say that the ball cut-off in all places is the most practical and the most efficient.

Mr. Sample: I would like to ask Mr. Lenfest what his experience has been with the spray gun.

Mr. Lenfest: The spray gun is coming into use all over the State, and is doing very good and effective work, and I believe I may say that I helped start the first machine in the State that had guns with it. That was some time in 1916 or early in 1917, and the guns that were sent down were intended for use in the apple orchards up north. They had very large disc openings and the pump was one of the biggest on the market. It would deliver 25 gallons per minute at 300 pounds pressure. It didn't take the

pump long to empty the 300-gallon tank. There were men from Sanford, Orlando, and all around who came to Winter Park to see it demonstrated and they said it wasted too much solution and because the size of disc used would discharge 10 gallons per minute at 300 pounds pressure. After everybody had gone, another man and myself spent the rest of that afternoon and all the next day working on the size of the disc and testing it out to see what we could do. We found when we got a moderate sized disc that didn't throw too much solution it would do very good. Of course, we had never used the gun type before, and didn't know how to go at it, and we learned a good many things at that time. Others, as well as myself, since that time have worked out many new things in the way of handling the gun and it is my belief that the gun will do practical, satisfactory and thorough work in the hands of a good operator. You can't turn it over to anybody and everybody; one must be willing to work and work fast and get wet sometimes in getting under or close to the tree. But for covering the ground rapidly and efficiently it does the work.

Dr. Sadler: Unless your limbs are high you could not get at the under side.

Mr. Lenfest: The way we worked that was to form a habit always of spraying thoroughly across through the trees to get the under limbs on the opposite side. The question has been asked whether or not the gun has an angular nozzle on the short rods. It has not. On some of the rods, like the



Pilot rod, there is a slight angle, but in speaking of the gun, I am talking of the short gun that is only  $2\frac{1}{2}$  or 3 feet long, and those are the straight type of nozzles. The nozzles are right here in the front of you and if you will spray across through the trees and get those lower leaves and branches where the tree is close to the ground, you can cover the lower branches. We tried this out and found that it will work very effectively. It takes a little more solution, but you save a whole lot of time. Another thing I might mention is that when you are spraying young trees and young groves, don't try to use a gun. One wastes too much solution and time. Get a nozzle that will handle plenty of juice and a rod long enough so that you can work down between two rows and spray one on each side. Of course, after the trees get larger you will have to work around them, but when they are small, a rod will work much better than a gun.

Mr. Yothers: Would you recommend a gun for spraying whitefly?

Mr. Lenfest: Yes, I have seen it used effectively, but you have to be careful to do thorough work. I might ask Mr. Grossenbacher about that, he has seen more of gun spraying in the southern part of the State than I have.

Mr. Grossenbacher: In regard to the use of the gun for spraying whitefly, I have seen very thorough jobs with guns, although I have seen very poor work done, and the work was of very little value. It depends on the height of the tree, the height of the

foliage from the ground as to what results are obtained. It must be done on the under side and the only way the lower branches can be hit on the opposite side, is across through the trees, and that sometimes proves troublesome, and may interfere somewhat and cut down efficiency. But in nine tenths of the cases with trees of moderate size the gun can be used very effectively against whitefly.

Dr. Ross: Mr. Chairman, that entirely varies with my experience with a gun. I have given personal attention to spraying for whitefly with a gun and I have never seen a man yet, or a crew, that did any effective work.

First of all the spray is projected with tremendous force, if you are having efficient pressure. For May spraying, the new growth if pendant, one leaf lapping over another one, one layer of leaves lapping over another layer. If you are operating from the outside you will likely drive those leaves together. There is absolutely no way on the face of the earth to reach the under side of the leaves except with an instrument or a nozzle that is angular, that can be put in among the leaves and worked among them so as to get to the under side of each leaf. It is an absolute fallacy to waste your time and money to spray for whitefly on the under side of leaves with a gun. We have all had the gun in our neighborhood, and we have all thrown them away as far as whitefly spraying is concerned. (Applause.)

# The Utilization of Tractors as Power for Pumping Units in the Citrus Grove

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Mr. A. O. Kay, United States Department of Agriculture, Ft. Pierce, Fla.

It is a generally conceded fact that the tractor is a necessary part of the equipment for a farm or grove, and as there are tractors of various sizes available, suitable for the various sizes of farms or groves, it remains only for the grower to decide whether or not he can afford to purchase that tractor suitable for his own particular needs. As a matter of fact, from the economic standpoint, no grower can afford to be without a tractor, as it enables him to do work often impossible with animals; to do heavier work with less wear and tear on the motive power; and to do his cultivation in a shorter period, thus giving him additional time to attend to matters of equal importance.

It is then a matter of demonstrating to the owner, or prospective purchaser of a tractor how he can utilize his tractor to the best advantage, and thereby realize the most on, and make him feel satisfied with, his investment. It has been estimated that the tractor is worked on an average of about 120 days a year for cultivation purposes, the remainder of the time lying idle, subject to rust and deterioration unless properly cared for, and unless given particular care in sheltering. This

is of great moment in Florida. It is also estimated that the probable life of a tractor is about seven or eight years.

Before the advent of the tractor, it has been necessary to purchase special machinery to do power work on the farm, which machinery also remains idle for a certain period during the year, and often for a period of years. Then again, because of the high initial cost of a pumping unit, particularly the engine, having sufficient power capable of fulfilling the needs for irrigating the farm or grove, that necessary part of the equipment has often been omitted and the crops have suffered during protracted droughts. This oftentimes has resulted in a partial or even total loss to the grower. The tractor is making it possible to eliminate the engine furnishing such power (which very often is the most costly part of the equipment) and by this same substitution is increasing or lengthening the yearly working period of the tractor, and by so doing, giving the grower greater returns for the money invested.

It is my purpose, therefore, to show the adaptability of the tractor for power



on the farm, especially for the pumping unit, as applied for irrigation.

As stated before, there are tractors of various types and sizes suitable for the various sized farms, therefore it is first necessary for the grower to decide on the type of tractor and the amount of power needed for the proper cultivation of his tract. No one would consider purchasing a four h.p. tractor for cultivating a twenty-acre farm or a twenty-five h.p. tractor for a five-acre farm, so that we can assume that a tractor having sufficient power has been, or will be obtained.

All tractors have, or can be fitted with attachments for supplying power either direct or by belt. The tractors, where already fitted, are rated at a certain power on the drawbar and a greater power on the belt; for instance, one tractor is rated at fifteen h.p. on the drawbar and twenty-five h.p. for belt work, and is known as a 15-25 tractor. The larger or higher power tractors are fitted with pulleys for belt drive, so that the additional power on the belt is a decided advantage, as it gives ample power, even after taking into consideration the reduced efficiency of the engine unit because of the friction, stretching and slippage of the belt, for pumping when the pump is belt driven. This friction and slippage must be given more careful consideration when using the smaller and lower power tractors for between the losses in the engine and pump, the power transmitted is often reduced fifty per cent; and when recalling that the smaller tractors are only designed for from two to four h.p. on the belt, this means that the work actually per-

formed by the pump may be only equal to one or two h.p. Some of this loss may be eliminated on the smaller tractors by directly connecting the small tractor to the pump with a flexible coupling connecting the engine shaft with the pump shaft. An agent for a certain small tractor states that he has directly connected his tractor and has obtained very satisfactory results. Another manufacturer states that it would be impractical to directly connect his tractor with the pump by means of a flexible coupling; this machine is now fitted with a pulley for belt work. Perhaps it would necessitate a lengthening of the shaft and a rearrangement of some of the minor parts of the machine, but the increased efficiency would more than repay the manufacturer who adopted this type.

Where the tractor is directly connected with the pump, a more stable foundation is necessary than when the pump is belt driven, and yet it is this same unstable foundation and liability of slipping of belt which tends to reduce the efficiency of an engine and pump. When speaking of direct connection, I am referring especially to connecting with centrifugal pump. This type of pump is the cheapest, both in first cost and in operation, and more effective under all irrigating conditions. This type can be obtained in any size and capacity; it is more steady in operation, returning less shock or strain to the motive power, thereby increasing the efficiency of the engine. I would recommend the direct connection only for the smaller 2-5 h.p. tractor, and when the tractor speed is rated



near the pump speed necessary to meet the required condition.

The tractors on the market have attachments with which to regulate the speed, one by an electrical governor, others by a lever on the carburetor and others by adjusting the governor to regulate the speed, and as the pumps are also rated at a certain discharge when revolving at a certain speed, it is possible to regulate the speed of the engine and pump in order to utilize its power to the best advantage. Where the engine has only a single speed, by properly proportioning the engine and pump pulleys the required speed of a pump can be obtained.

After the grower has secured a tractor sufficient for his farming needs, the next consideration is whether or not it contains enough power for, and how to adapt it to, the pumping of a water supply adequate for his farm or grove. In order to know this, he must first know the requirements of a farm or grove—the quantity of water required and the best method of applying it. Knowing this he can estimate the number of days his tractor can be used as replacement for the engine. In order to estimate the need of irrigation, a study of the rainfall conditions that have prevailed in Florida and of the results of soil moisture tests in the grove is needed so that a digression on that subject will be permissible, still keeping the general topic in mind.

Citrus fruits make their growth during the spring and summer months, during which time they must receive moisture regularly and not be per-

mitted to become too dry. After irrigation is begun during the dry weather, the commonly accepted practice is to apply an inch of water every ten days. This application produces the best results, so that, in order not to have the trees suffer from lack of moisture, without irrigation, we must have a rainfall somewhat regular, supplying that amount which will be held by the earth as a reservoir and conserved for the trees. How often does such condition exist? In many places in Florida there is no plowing in the groves from November to the latter part of February. One of the reasons, and probably the principal one, why this is not done is that cultivating a grove in the winter months, particularly in January and the early part of February, tends to stimulate the trees, causing them to put out a new growth which may be nipped by a later frost. By reason of this lack of the cultivation of the grove during the winter months, the ground is rather hard or crusty and from which the water will run off instead of percolating into the ground, which would occur were the surface soft or mulched. This water which runs off is needed by the trees during the spring, for the new growth and to prevent the tree from wilting, causing the young fruit to drop.

A study of the rainfall records for Hypoluxo, Pensacola, Ft. Myers and Orlando sections, representing all parts of Florida, shows that there are very few years when rain has fallen near the right amounts during the growing season. Perhaps the rains have been heavy and of short duration, which

means a pelting, packing rain resulting in most of the water running off on the surface—or the rains may have been light and soon evaporated by the wind and sun, of which there is plenty in this State.

From the data at hand, and a study of the rainfall record, it would seem fair to estimate that about half the years since 1890 are deficient in rainfall at the proper time, and so would make irrigation profitable. And yet the number of years when irrigation was necessary is not the main consideration, but how badly the trees needed the moisture and how much the growth of the trees was retarded, also what permanent injury the trees sustained and the financial loss to the grower.

It is not possible to determine the exact amount of moisture that must be present in the soil to keep the trees in good condition, as the citrus tree is very hardy and will not show wilt for a considerable time after the available moisture is exhausted. But there can be no doubt that the available supply is gone when the soil will run from the hand like dry sugar, which it does when the moisture supply has fallen below three per cent. (The percentage referred to is based on the ratio of the weight of the dried sample to the difference in weight between the wet and dried sample. In other words, it is the ratio of the weight of the dried sample to the weight of the water it contained, and is based on actual tests.) Then, too, upon the texture and structure of the soil depends the amount of water to be applied, for it is known that a clay soil is more retentive of

moisture than sand. There are still other factors which are of importance in determining the need for, and method of irrigation; shallow, rooted crops such as truck and small fruits will suffer from drought much sooner than deep rooted trees in the grove. This difference in cropping also requires different methods, as trucking will require more frequent irrigation than is necessary for groves. A tree, with its larger and deeper root development can draw from a larger area than truck plants, and does not depend so much upon the action of capillarity.

A study of the rainfall records, in conjunction with a study of the results of soil moisture tests in the grove would lead one to the conclusion that there has been a need for irrigation during ten of the past twenty years, and that irrigation would have been beneficial to the crop and profitable to the grower. It is impossible to estimate the number of times when irrigation should have been practised, but basing an estimate on the periods of drought, as shown by the rainfall records, and assuming that the plant and losses due to evaporation require one inch of water every ten days—some plants requiring considerably more—a study of the rainfall charts would show that about four irrigations every other year would be about an average for groves. But more irrigation would be required for trucking.

However, the groves have been more neglected in this matter than crops in the sections where trucking is practised, so that it is not a difficult matter for the trucker to recognize the



value of irrigation, and the need for an irrigating plant.

The number of days required to irrigate a grove depends upon the amount of power used, the quantity of water pumped, the sizes of pipe for conveying the water and the method of distribution. But from observation of methods as practised it would seem that from four to six acres would be a good average of what could be irrigated in a day. The prospective irrigator then can use these figures as a basis for determining the number of days a year required for irrigating as applied to his particular tract, and hence the number of days that the tractor can be used for pumping.

When the tractor is to be used as power for pumping, the same consideration must be given in determining the power required as would apply to a stationary engine used for the same work. First, determine the number of days to be consumed in irrigating. This will depend upon the size of the grove, the help available and the working period of the day. To irrigate the grove in a certain period requires a certain amount of water which, reduced to gallons per minute, will determine the size of pump required. Pumps are rated at a certain number of gallons per minute when it turns a certain number of revolutions per minute, or at which speed it has its greatest efficiency. This speed, and capacity, are marked on all pumps, having been tested in the factory. The speed of a tractor can be regulated on one by an electrical governor, in others by adjustment of the

governor, and still others by a lever on the carburetor regulating the flow of fuel as the speed of an automobile is regulated. There are some, however, that have only one speed.

After ascertaining the speed of the driving pulley, it is but a simple matter to determine the size of pulley to be placed on the pump, in order to give to the pump its proper speed. For instance, if we have a driving pulley revolving at the speed of 2,000 feet per minute and the pump is to revolve at a speed of 800 revolutions per minute, by dividing the 2,000 feet per minute by the 800 we find that the driven pulley should have a circumference of two and one-half feet, which reduces to a pulley eight inches in diameter. Another method of proportioning is the diameter of a driver; diameter of driver or speed of tractor; speed of pump. When the speed of the tractor is high and can be regulated and the pulleys are already in place, by using a speed indicator it is possible to reduce the speed of the tractor until the pump is turning at its most efficient speed. The speed of the pump can be regulated by changing either pulley. Where the small tractor is direct connected it is essential that the speed be adjustable to conform with the optimum pump speed. That is one of the reasons why it is necessary to have a solid foundation when direct connected; another is so that the machine can be placed in exactly the same position each time and fastened securely by quick attaching methods to the pump. Where the pump is belt driven, blocking must be placed, keeping the



tractor at a fixed distance from the pump, in order to keep the required tension of the belt.

In setting up the tractor for driving the pump, care should be taken to have a proper alignment, otherwise the belt may be continually slipping off or wear unduly on one side. Spacing the tractor from the pump depends to a great extent, on the sizes of pulleys used and the horsepower of the tractor. One well-known pump company makes it a practice to figure 8-foot centers on engines and pumps where the power does not exceed 6 h.p. and when the pulleys or pump and engine are small and of approximately the same size.

Where the pulley or the engine is much larger than are the pumps, a good rule is to add the diameter of the two pulleys together and multiply by three to get the distance between the engine and pump shaft. On outfits of ten h.p. and larger, ten feet is the minimum spacing, depending upon the size of the pulley. However, the main object to be obtained in spacing is to have the belt come in contact with as near half the pulley surface as possible.

Where the engine and pump are spaced about ten feet apart, the sag of the return side of the belt should be about one or one and a half inches and greater as the distance between machines is increased. Should an idler be required, it will work most satisfactorily when placed one-fourth of the way from the driving pulley. A leather belt will stretch six per cent of its length, so this must be watched and adjusted for an efficient working of unit width of belt. The belt should not be too tight, otherwise trouble will follow by the belt working off, friction will be increased, and bearing will overheat and burn out.

As to the comparative cost of operation between where the tractor is used for the pumping unit and where a stationary engine of smaller power would be sufficient, most of the tractors on the market are designed for and will burn either gasoline, kerosene or even distillate, while stationary engines of six h.p. or less require gasoline in order to produce the best results.

# Tractors in Florida

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Frazier Rogers, College of Agriculture, University of Florida, Gainesville

With the price of feed constantly advancing and labor demanding more wages and less hours, the substitution of the "iron horse" for the "old gray mule" is being given more consideration today than at any time in the past. The aim of this paper is to present, what is considered to be, from the citrus grower's standpoint, the most important facts and figures reported by the owners of ninety-three tractors in this State. It must be clearly understood that these figures represent average results obtained and not the maximum possibilities of the tractor. These averages are believed to be worth more to a grower in determining the possible value of a tractor for his work than are the maximum figures from test. No matter how carefully conducted, the latter would represent, at best, only a limited number of machines operated under especially favorable conditions; while averages here given represent ninety-three tractors with a value of \$107,163.00, operated by incompetent as well as competent operators, and under actual service conditions, which are exceedingly difficult to duplicate in tests. A prospective purchaser may reasonably count on equaling the average performance of his neighbor, but, of course, he

should strive to equal the record of an expert.

I might say a few words here as to my source of information for this paper. It was only through the co-operation of the Agricultural Extension Division of the College of Agriculture, and more especially of Mr. C. K. McQuarrie, State agent, the county agents and the growers of the State who were willing to give us this information, that I am able to present these facts and figures today. Three hundred and fifty questionnaires, containing the most important questions on tractors were sent to tractor owners. Of this number one hundred and three were returned filled out, ten of which cover garden tractors and are not treated in this paper. If in the future the growers will bear in mind that this is our best, and our only source of information and will co-operate with us by filling out these lists of questions and returning them to us, then we will be able to have a much larger number of machines represented. However, I feel that we have data from a sufficient number of machines, there being ninety-three in all, representing eleven different makes and six different sizes, and that the figures given here will be of real value to those interested.

Of course the all-important question with the prospective purchaser is, "Are tractors profitable in Florida?" This question then appeared first on the list and to it we received five different answers. Of the ninety-three tractors represented, 72 (or 77½%) were considered profitable; 12 (or 12.9%) were considered unprofitable; 2 (or 2.2%) had not decided as to their profitableness or unprofitableness; 1 (or 1.1%) was doubtful; 1 (or 1.1%) stated that it depended upon the operator; and 5 (or 5.2%) failed to report on this question.

Here the question might arise as to the comparative ages of the machines that were profitable and of those that were unprofitable. The averages as given by the owners indicate that the average age of the profitable machines was twelve months; while that of the unprofitable ones was only ten months. Don't understand me to say that the oldest of the profitable machines were only twelve months in service for some of them had been in use for three seasons, while others had been in use only a few months, bringing the average to twelve months. So you can readily see that it is not just the new machines that have been reported as profitable.

Theoretically the advantages of a tractor are many but what we are after is to know practically what the principal advantages and disadvantages are in the use of a tractor. A summary of the replies to these questions would indicate that the most important advantage of a tractor is its *ability to do work quickly*. This point was emphasized by 63% of the owners making re-

ply. *Saving on man labor* was next in importance as this is the logical result of using a machine which will permit one man to do work faster than with the outfits previously used. *Does better work* was mentioned quite frequently. *Economy, available for belt work, clear land of palmetto roots, and works in hot weather* were all given as advantages, but mentioned by a much smaller percentage of tractor owners. In our warm climate the last ones should be given due consideration. The principal disadvantages mentioned were *the excessive wear on the parts, inefficient operators, and excessive cost of repair parts*. The *excessive cost of machines* was also given by some growers as a decided disadvantage; also *inability to turn in small space*.

### Size of Outfit

The two-plow outfit was found to be the most common in the citrus belt of Florida. Of the 69 growers who answered the question concerning the size of outfit for use in this State, 57 (or 82.6%) were in favor of the two-plow outfit. The one-plow outfit was second in favor but not popular as only 8 (or 11.6%) of the growers recommended it for use here. There were only two three-plow and one four-plow outfits reported. It might be of interest to know that a smaller per cent of the two-plow outfits failed than either of the others. Of the reported failures only ten per cent of the two-plow outfits proved so, while twenty-five per cent of the one-plow, sixty-seven per cent of the three-plow and all of the four-plow outfits were failures.



The 8-16 and 9-18 h.p. tractors seemed to be much more successful than the larger or smaller ones.

### Number of Days Used Per Year

The number of days that a tractor can be used in this State is considerable more than in most states in the Union. A number of growers stated in their replies that their machines were in use all of the time when the weather would permit; others gave as high as 300 days, while the majority was much less. An average of the number would show that 123 days is probably the correct number to count on during a twelve-month period. The farmers of New York and Illinois report using their machines only forty-five days during the year. Of course we should not expect our machines to last as long as those that are only used one-third as much.

### Life of the Tractor

This brings us to one of the most important tractor questions—the life of the tractor. A large number of the growers had not used their machines long enough to give a fair estimate as to its probable life; thus we find that thirty-three omitted this question. However, the average of the estimates given by the others reporting, while varying from three months to ten years, are, in my opinion, reliable, and can, under most conditions, be counted upon. This average is 3.98 years. Twelve growers did not report the life of their machines in years but stated that it depended upon the op-

erator entirely. Very few of the entire number failed to mention this most important point. The owner or owner's sons seem to be able to get more out of the machines than a hired operator, as only two of the twelve tractors reported as unprofitable were operated by them. Seventy per cent of the machines were operated by hired operators, 16 2-3 per cent of which were failures; while thirty per cent of the operators were owners or owners' sons and only seven per cent of these machines were reported as unprofitable. There is a little more than a two-to-one chance of the tractor making good where the owner or his son operates the machine. The wages of the hired operators run from \$1.50 to \$6.00 a day with an average of \$3.75 a day.

### Number of Acres Per Day

While a number of growers used harrows exclusively for grove work, others used plows at certain seasons. As the two-plow outfit constitutes 82.6 per cent of the tractor outfits in use in the citrus belt I will give you the figures on this only. An average for a ten-hour day was five acres per tractor.

### Reduction of Work Animals

Sixty-six growers reported a reduction of horses ranging from two to six animals per farm. The average reduction was 3.3 animals per farm. Sixteen report no reduction and one-half of the growers who report tractors unprofitable are among those sixteen. We find that thirteen have done away

with horses altogether and are doing all of their grove work with tractors.

### Dependability

On the question of dependability 78 growers, or 88.6 per cent of those reporting, consider the tractor a dependable source of power, against 10 or 11.4 per cent of those who do not consider it so. The operator was frequently mentioned in regard to the dependableness of the tractor.

In view of the fact that the operator is so essential in determining the profitableness or unprofitableness, length of life, dependability, as well as the cost of plowing per acre, the question arises as to the advisability of an operator or rather a prospective operator attending a short course in tractor operation before attempting to operate a tractor. Some of the answers were as follows: "By all means;" "Certainly;" "Should know all about them;" "Not necessary;" "Useless expense." The number replying in the affirmative was 66 against 18 answering in the negative, 9 not reporting.

The quality of the work done by the tractor as well as its reliability was almost wholly dependent upon the operator. It is the opinion of 71 growers or 80 per cent of those reporting that the tractor is capable of doing better work than horses. Fourteen growers or 16 per cent report it equal; while 3 growers or 4 per cent of those reporting consider it inferior. The work of the tractor is to pull the plows and

if they are out of adjustment of course that is not the tractor's fault.

The tractor did not only permit a reduction in the number of work animals on the groves but also an increased acreage on 64.3 per cent of the farms reporting. Forty-seven growers reported this increase while 26 had no such increases. The number of acres that a grower cultivated per tractor varied from 25 to 300, giving an average of 136 acres per machine.

### Gasolene and Oil Used Per Acre

The amount of gasolene and kerosene used to plow an acre was about the same. There was a very slight difference in favor of the gasolene. This difference does not usually amount to very much and for most purposes one would be safe in using the same quantity for either in figuring fuel. There was a slight difference in the different sized machines, but an average of all would be 2.62 gallons of fuel per acre. There was also quite a variation in the amount of lubricating oils used. Some reported only a fraction of a pint while others reported near a gallon. The average amount was four-fifths of a quart.

### Cost of Machines and Repairs

The yearly cost of repairs could not be obtained very accurately. Some had not had their machine in use a year and, of course, could not foretell the repair cost. Others had used their machines one year without any repair charges, while with others the repair charges was a big item. However, an

average repair bill of the 29 reporting was \$54.00 for the first year. The repairs could be expected to increase as the machine is used more and so the average for the second year was given as \$93.00. While the third year showed an average repair bill of approximately \$150.00. These charges might look excessive to the outsider from other sec-

tions of the country, but considering the adverse conditions under which a tractor must operate in our sandy soils, I consider them sufficiently low.

The average costs of the one-plow outfits as reported by the owners was \$780.00, while that of the two-plow outfit was \$1,170.00.



# Guatemalan and Mexican Avocados Fruiting in Florida

By John B. Beach, West Palm Beach, Florida

The avocado trees which have been commonly grown in Florida for the past fifty or seventy-five years belong to the tropical or West Indian type, which is found growing generally at or near sea level in tropical America. Its season of maturity comes in summer or early autumn, while the Guatemalan type, which is found at altitudes of 3,000 to 5,000 feet in Guatemala and other parts of tropical America, ripens six months later; moreover the lower temperature common to these altitudes render it hardier. On account of these desirable features the government began the introduction into Florida of seedlings of this type fifteen or twenty years ago. About the same time private individuals in California planted seedlings of this type, as well as the still hardier Mexican type, from the adjacent table lands of Mexico. Of these early introductions we have many more that have reached us by way of California, than of those introduced direct by Washington, but in 1916 and 1917 an expedition into Guatemala, headed by F. W. Popenoe, under the auspices of the Bureau of Plant Industry secured budwood and seed embracing the most desirable to be found in that country.

Mr. Popenoe's father, Mr. F. O. Popenoe, is one of the most prominent avocado growers in California, and is responsible for a large portion of the promising varieties now fruiting in both states.

Scores of different varieties which have been brought from California, in the past ten or twelve years, have been generally introduced into our groves by cleft grafting them upon old bearing trees of the tropical type. This method generally produces fruit in two or three years, though the first crop or two is not always normal in every respect and cannot always be relied upon as an exact criterion of what the variety will do ultimately. Out of the scores of different kinds thus tried, probably at least fifty per cent have been discarded because of the development of some objectionable feature. Out of the other fifty per cent I will only mention a few of the best tested and most promising varieties at the present time. However, it must be borne in mind that it takes years to make a fair test of a new variety. Two years ago the California Avocado Association gave official endorsement to some eight different varieties, as being the best suited for commercial planting

under California conditions. Of these, six are pure Guatemalan—Taft, Spinks, Blakeman, Sharpless, Lyon, and Dickinson; one Mexican, the Puebla; and the eighth, Fuerte, a hybrid of the two types.

The **Taft** has been quite generally tried in Florida, with generally pleasing results. While it seems to give better satisfaction in some localities than others, it may be classed as a standard sort for the February market. Its fruit is medium in size, pear shaped and green in color; quality excellent and trees, productive, but not precocious, as is the case with some. It seldom bears under four years, and this is a good feature as it then has attained sufficient size not to be injured by over production, and at the same time, can hold a crop of respectable proportions.

The **Lyon**, on the other hand, tries to bear itself to death during the first year, stunting itself by over production of fruit, and the fruit generally cracks before it reaches maturity.

The **Spinks** is a splendid, vigorous grower, and seems to hold a happy medium between precocity and tardiness. It begins to bear at two years, but has not been fruiting here long enough to establish either its exact season, or its productiveness. For two seasons it has ripened in November, making a round purple fruit of excellent quality that is over a pound in weight. This year it promises to give a more reliable test, as my trees are loaded with fruit.

The **Sharpless** has not as yet fruited, but promises well as it is a good grower. We have no reason to doubt that it will develop the same as in Cal-

ifornia, where it seems to be the most general favorite of all pure Guatemalans.

The **Blakeman** has fruited at the Miami Experimental Station for two years, producing fruit of excellent quality, green, pear shaped and weighing  $1\frac{1}{2}$  pounds, that ripens in January. It seems a good grower, and promises well.

The **Dickinson** has not fruited, but is a good grower, and is promising, though the small size of the fruit is against it as a general market favorite. It has set well this season.

The other two California favorites will be considered under the general heading of the Mexican type. "In the spring of 1914," writes Mr. E. E. Knight, of Yorba Linda, California, "I left Los Angeles for the Republic of Guatemala, to bring back, if possible, buds of the famous hard shelled avocados grown in that country." He spent the year there, and returned with specimens taken from the best trees he could find. Out of these he selected four which he deems of special merit, and all of them are now growing here. Here I will mention that in California seed of Mexican type are easily obtained from across the border, and for this reason if for none other, are generally employed for stock. All the trees that I have bought in that State and planted here have turned out poorly, being, without exception, weak and sickly growers, owing, I have no doubt, to the Mexican roots which do not thrive on southern sand hills.

All my successful trees are grafted on native roots, grafted after arrival



here. All four of Mr. Knight's trees are good, sturdy growers, and the **Linda** fruited this winter. Its fruit weighed thirty-six ounces. Mr. Knight describes it as follows: "Round;  $4\frac{1}{4}$  inches in diameter; weight 2 lbs.; color, purple; seed, fifteen per cent of weight of fruit." It has set a good crop for 1921. The **Queen** set fruit last year, but all dropped in June and July. It is trying again this season, and we hope for better luck. Its description is: "Pyriform; 5 inches long; weight,  $1\frac{1}{2}$  lbs.; color, purple; seed, seven per cent weight of fruit."

The **Rey** fruited this winter, but its fruit was below standard in size, too small for the market. The **Knight** has not as yet fruited, but is loaded for next winter.

**Walter's Royal** was fruited by Mr. Hendry at Fort Myers, but the fruit was very small and deemed by him as worthless. From this variety, strange as it may seem, have come two seedlings, which are now among our most popular sorts, and many acres are being planted in Dade county, this year to them. They are the **Taylor** and the **Wagner**. It seems that there were two seeds taken from specimens of the **Royal** sent to Washington for examination, and one seedling was sent to California, while the other was planted at the Experiment Station in Florida and has become our **Taylor**.

The **Wagner** has been bearing for Mr. Krome at Homestead for two seasons, and he has had fruit as large as twenty-two ounces, though the average weight is considerably lower. Quality is good; color, green; oval in

shape; and it seems a free bearer, beginning young. Its season is January.

The **Taylor** has been bearing five or six years and has proven a reliable cropper; of fair quality; medium size; color, green. It strongly resembles **Wagner** in foliage and habit of growth, but is more vigorous, and not quite equal in flavor. Its season is January. While newer introductions may prove superior, this variety has established a record which entitles it to recognition as a variety of commercial value.

The **Atlixco** has shown superior quality with Mr. Krome, averaging over twenty ounces and running up to twenty-six. Season, February; good grower; productive.

The **Solano** is a great favorite with Mr. Cellon at Buena Vista and ripens with him in December and January. In California they find it low in fat content, but Mr. Cellon finds it excellent with him. All agree that it has a small seed, is of beautiful appearance, a good grower, and productive, though at Homestead it generally drops in October. Avocados often blossom several times, and it may very well be that the October fruit is set by an early bloom, while the later ones at Buena Vista, may have been from a later bloom.

Of the recent Popenoe introductions three fruited here this winter.

The **Nimlioh** (44440.) ripened in March, while samples eaten earlier proved immature. It is a very vigorous grower and two-year-old grafts are generally setting fruit this year. The fruit ripened here closely follows out the official description: "Broadly



oval in shape; weight 36 to 45 ounces; the surface is deep green in color, rather rough, the skin thick and woody. The flesh is yellow, free from discoloration, and of excellent texture and very good flavor. Seed medium size."

The **Panchoy** (44625.) ripened in December, and coincided closely with the official description which is as follows: "Very thick skinned, of unusually choice quality. In form it is broadly obovate; in weight, about a pound. The surface is rough, green in color; the flesh, deep yellow, smooth, of very rich flavor. The seed is small."

The **Lamat** (43476.) produced one fruit which was delayed in transportation to Washington and spoiled. It is not as vigorous a grower as the other two. Many others of this importation are setting fruit for next winter's crop.

Of the Guatemalan seedlings imported direct by the Bureau of Plant Industry early in the campaign, and planted in Florida, the **Winslow** has proven worthy of commercial planting. While the size is below medium, it is large enough to be served cut in half as two portions per fruit, placing it on a commercial basis. It seldom weighs under ten ounces. Its season is April, though it may be marketed in March and is then of good quality. This year the first natural dropped fruit was found April 25th, and it will hold a large portion of its fruit well into June. My tree held a maximum crop last year, and a similar one this, and has a good crop set for 1921. Squirrels, protected by a city ordinance, have been exploiting the fruit so diligently that I have

had difficulty in finding a dozen which had not been nibbled by them to send over to Ocala, and Mr. Niles will see that those interested may have a chance to sample them. I offered some at the last meeting which was held in this place, but forgot to pick them long enough ahead so that none were good to eat until the close of the meeting, when most people had gone home. This year I picked them upon the first of May, and they should be mellow by the 4th and 5th.

A seedling from the above was line grafted by Prof. Rolfs at his place at Buena Vista upon an old stump, so that it bore two years from the seed, and it ripened last November. In shape and quality it very closely resembled the parent, but weighed 28 to 36 ounces. The skin was smooth and glossy, and this, taken with the early ripening season and size, makes it most probable that it is a natural hybrid with the tropical type. It has not yet received a name.

**Collins** and **Colla**, the other seedlings, have proved reliable bearers, but of too small size to be of commercial value.

The Guatemalan type is distinguished by tight seeds, and thick, woody rind, both valuable qualities for shipping. While the Mexican type, originating in the colder table lands of Mexico, are thin skinned; seeds often loose in cavity; and generally the fruit is very small, though very rich in fat. This type is distinguished by a characteristic anise odor belonging to the essential oil, present in sap and foliage, and sometimes in the fruit to the detri-

ment of its market value. Coming from regions often visited by frost, and sometimes ice and snow, it is very frost resistant, which makes it of great interest to middle and northern portions of Florida.

To prove how far north this type may be successfully grown, I have written to Alachua county and obtained a letter from the owner of one of the old avocado trees there, who is Mr. C. C. Shooter, of Earleton. He writes as follows: "While my tree has not so far been a heavy bearer" (this would not be expected from a seedling in any event) "we have had some fruit nearly every year, and I consider it the most valuable tree on the place, and we look forward to the ripening of this fruit with greater pleasure than any other. The tree has never been injured by a freeze. The cold three years ago took off some of the leaves, not by any means all, and there was even a little fruit the following summer. I have carefully watched the effects of frost on the bloom. On two occasions it stood at 28, the last time combined with heavy white frost, without any injury. and following this cold there will be quite a good crop this summer, the biggest it has ever had. The fruit is now as large as cherries. It is worthy of notice that the avocado bloom stood 28. The peach bloom was injured by a much lesser degree of cold later in March, and the entire LeConte pear bloom entirely killed.

"The tree is a Mexican seedling sent out by the Department of Agriculture probably between 1895 and 1898. It is now over 35 feet high, and measures

52 inches in circumference at the ground. Has never been cut back or injured by cold; stood 18 degrees of cold with only the loss of a few leaves. Fruit pear shaped and small. Purple when fully ripe. Quality, very rich and delicious."

From California, the **Fuerte**, a hybrid between Guatemalan and Mexican types, with tight seed and brittle rind of the former and the thin skin, high percentage of fat and anise odor of latter, is a very promising fruit. It seems about as hardy as the true full Mexican, and combines many of the advantages of both types. Like Solano there is some difference of opinion as to its season of ripening, but this is probably due to the different blooms, as explained with regard to Solano. Fruit has matured in November, December, and January at different places, but I think it may be set down as a January fruit. California analysis gives it more fat than the average ripe olive, and nobody has ever taken any exception to its vigor and productiveness. Mr. Celson complains that he has found hard spots injuring the quality in some instances, but this complaint is not general. My own fruit has dropped early (November and December) but I lay it to early bloom, and young grafts on old stock. Weight one-half to one pound. Color green.

The **Puebla**, the other Mexican adopted by the California Association, has not as yet ripened fruit in Florida, but is a good grower, and promising.

The **Harman** produces a small fruit with a glossy greenish-purple surface and loose seed. Flesh, cream color, of

fine buttery quality and rich flavor. Good grower and heavy bearer, ripening in July and August.

The **San Sebastian** is a tremendous grower, on West Indian roots, and ripens in June and July, when good fruit is very scarce. It is a good bearer, of excellent quality, though averaging small (10 to 11 ounces, sometimes reaching 13) is large enough to be commercially valuable.

The **Gottfried** is a seedling of Mexican type from seed sent over from South America. The original tree is enormous, and the fruit is the largest of the Mexican type I have ever heard of. It averages about a pound and runs up to 19 ounces. Pear shaped,

purplish-black; seed inclined to be loose and skin peeling readily. Quality excellent, free from fibre or essential oil twang; rich and smooth yellow meat. Season, August.

While there may be, and probably are, many varieties under development and test that will prove superior to some that have already been tested out, we have enough tested sorts, of known value and qualities to enable Florida to have avocado fruits ripen every month in the year in the more favored parts, and in the colder sections to have reliable crops of this most valuable fruit, which may be depended upon when oranges, peaches, and true pears are frost killed.



# What Constitutes a Good Commercial Variety of Avocado

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W. J. Krome, Homestead

The question most frequently asked nurserymen handling avocado stock undoubtedly is, "What variety shall I plant?" Unless the one to whom such a query is put already knows the location at which it is expected to plant the trees, the class of land upon which they are to be planted, the disposition which it is intended to make of the fruit when the trees come into bearing, and something of the experience and ability of the planter as a fruit-grower, this question is about as easy to answer intelligently as that other one, "How long is a piece of string?"

There are varieties of avocados which may be grown with a fair degree of safety as far north as one would plant citrus, and there are other varieties which are too tender to withstand the cold on any part of the mainland of Florida. There are varieties which do well in the interior and are failures along the coast, and there are varieties which are adapted for highland planting but do not thrive on low, wet soil. And as in each instance cited there are also varieties of which the exact reverse is true, it is evident that location and class of land must be given consideration in the selection of an avocado variety.

There are a number of avocado varieties which have qualities that entitle them to places in what is usually called a "home-planting," where it may be expected that the fruit will be mainly for the personal use of the grower and his family, but which have faults that lower their value from a market standpoint. And there are likewise varieties the fruits from which rank high when considered on a general commercial basis, but which are not particularly attractive for home use. There are avocados adapted for a fancy mail-order trade, avocados which best suit hotel and restaurant requirements, avocados which may be safely shipped to Europe and avocados which must be disposed of on a local market. Very certainly the intentions or expectations of the grower as to the disposal of his fruit play an important part in determining the variety he should plant.

Finally the personal equation of the prospective planter must be considered, for there are avocados which should be set out by no one but an expert or an enthusiast willing to profit by his failures, and on the other hand there are "fool proof" avocados which will grow nearly anywhere or for any-

body. Also we have avocados which make fine vigorous trees bearing regular, full crops of first-class fruit, which are the despair of the nurseryman on account of the difficulties attending their propagation.

The future of the avocado industry in Florida, from a commercial standpoint, however, depends upon the planting of groves throughout those portions of the State generally designated as South Florida, the Middle and Lower East Coast and the Lower West Coast, and it is with reference to plantings in these sections, on well-drained land, which would be considered adapted for citrus, that I will try to outline the characteristics which I believe are essential for an avocado variety suited for growing and marketing in a general commercial way.

With avocados, as with other fruits, in selecting varieties for a profitable planting, careful attention should be given the character of the tree itself as well as that of the fruit which it produces. The ideal tree for orchard purposes is one which with fair treatment will make a healthy, vigorous growth, neither sprawling nor too rangey in form, producing full crops year after year. It is seldom that this perfection is attained in any tree, and when coupled with these characteristics we must consider the quality of the fruit which it bears, and the season for maturing its crop, we are indeed fortunate when we even approximately approach this ideal. Contrary to the rather general opinion, avocado trees when once well established are usually not difficult to grow. It is true that the

young plants are rather susceptible to damage by drought, sunburn and frost, but if supplied with plenty of water, shaded from the direct rays of the sun and given reasonable protection against cold during their earlier period of growth, most avocados become sturdy, vigorous trees, free from many of the ailments which tend to make life miserable for the grower of other fruits. But in habit of growth there is great variation and the prospective avocado planter before laying out his orchard, should take pains to acquaint himself with such facts as are available regarding the form of the mature tree of the variety he selects.

Personally, I strongly favor the tree of comparatively low height and wide spread of branches, providing the growth is not inclined to be drooping or willowy, but quite a number of the best varieties of avocados which have so far been developed are produced upon trees which tend toward a tall, very upright growth and somewhat narrow spread. This is particularly true of some of the Guatemalans, including Wagner, Taylor, Atlixco and Lyon, all varieties of commercial value. If one decides in favor of planting trees of this type a much closer setting may be made than with those of wider spread, but careful consideration should be given to the matter of wind exposure. Of some fifty varieties of Guatemalans which I have grown, the Taft most nearly approaches my ideal in tree form, vigor of growth, and character of foliage, yet this variety is reported as not doing well in close proximity to the coast, where it is said to be

subject to damage by salt winds. Some of the varieties introduced from much higher altitudes than any to be found in Florida, give evidence of not being at home under our conditions, by severe blighting of the young growth and scorching of the mature foliage during our periods of greatest heat. Others have shown themselves particularly susceptible to Scab and kindred fungus disorders and should not be planted where such diseases have proven unusually troublesome on citrus. No matter how attractive the fruit may be, the planter is laying up trouble ahead for himself when he sets a tree which is not climatically adapted to his locality.

When it comes to fruiting qualities there are several points to consider besides the one of being prolific. To be profitable a fruit tree must not only put on good crops but must hold them to full maturity and must be sufficiently vigorous to withstand the drain, which heavy production makes, without being brought to a debilitated condition which precludes a good following crop. This point is of greater importance in the selection of an avocado variety than with any other of our orchard trees, for the reason that from the nature of its fruit, the crop draws more heavily upon the resources of the tree. No other known fruit contains so low a percentage of water nor so high a proportion of those constituents which are derived from the plant foods upon which the tree itself must rely for its growth and vigor. As a result of this drain, avocado trees of some varieties, unless very carefully handled,

come to the end of their fruiting season so badly run down that there is no chance for a crop the ensuing year.

It is the nature of the avocado, in its uncultivated state, to be a rather pronounced "in-and-out" bearer, a good crop year being followed by one, and often two, years of very light bearing. This is undoubtedly Nature's provision for recuperation after the fatigue of heavy effort, but it does not accord with the business of commercial fruit-growing and by selective propagation and by cultural methods we seek to eliminate, as far as possible, these seasons of light production. As most of our avocado varieties are removed only one generation from their wild progenitors we have not as yet advanced as far along this road as in the case of fruits which have been under orchard culture for a long time. In consequence, if the avocado grower secures varieties which produce, with fair regularity, crops of high grade fruit, upon trees which maintain a thrifty condition, he must, in the present stage of the industry, be content if he occasionally has short-crop years. Of the fall-maturing West Indian avocados the Trapp and Waldin are two of our best varieties. The Trapp has long been a standard avocado for market purposes and has many qualities which entitle it to a high place in the estimation of the grower, but it has the faults of over-bearing and inability to carry a full crop to maturity without a serious set-back. Largely on this account, many planters prefer the Waldin, which is not so prone to overdo in the way of fruiting, but carries its crops to ma-



turity with much less detriment to the tree.

Viewed from the standpoint of the fruit produced, first consideration must be given the season of maturity. As matters now stand the marketing season for avocados opens during the latter part of July or first of August, when the earliest varieties of the West Indian type begin to mature their fruits. These early avocados usually bring very good prices but this is mainly due to the small quantity available and until the markets for the fruit have been considerably extended it is doubtful whether the demand will be sufficient to take care of heavy shipments without overloading. The avocado at this season on northern markets, comes into competition with all sorts of other salad vegetables at a time when the prices for such food products are lowest.

Shortly after the earliest Florida avocados are mature enough to ship, the Cuban seedlings appear on the market in quantities such that prices range comparatively low throughout the latter part of August and until well along in September. Before the first of October the Cuban crop has usually been moved and Florida avocados control the markets. Prices then increase quite rapidly and hold at a high level as long as the fruit is obtainable. To within the last few years commercial avocado plantings in this state have been almost wholly confined to varieties of the West Indian type which mature their fruit during the months of October, November and December, and it is probable that the bulk of the

late fall avocados will be of the West Indian varieties for many years to come, though we now have fall-maturing Guatemalans, adaptable for growing farther north than it is safe to plant the West Indians, the fruit from which will find a ready market at good prices.

By the first of December West Indian avocados have become so scarce that prices regularly soar to very fancy figures, net returns to the grower of twenty-five dollars and more per forty-pound crate being quite the usual thing. So far no West Indian variety has been propagated which will regularly carry its main crop of fruit later than about December first, though on some trees and during some seasons, avocados of this type will hang on in perfectly good condition until after Christmas.

For marketing after December 15th and throughout the remainder of the winter and spring, we must rely upon avocados of the Guatemalan type, and of these a sufficient number of varieties have already been introduced and given a trial so that the grower may make selections which will give him continually maturing fruit from the early part of December until the first of May, with the possibility of extending his shipping season through the summer months if he so desires. On the basis of best commercial returns, however, the selection narrows to West Indian varieties maturing their main crop between October 1st and December 15th and Guatemalans ripening between December 15th and April 1st.

Next after the season of maturity, the quality, color and form of the fruit

itself is important. The flavor of an avocado depends mainly upon its percentage of oil content and while the northern markets do not now differentiate to any marked degree between fruit low in oil and that having a high oil content, the consuming public will soon become educated to demand avocados with a pronounced nut-like flavor and those of a watery or insipid character will be discounted by the best trade. This is more particularly true in regard to the West Indian varieties, some of which run very low in oil, with flesh of a watery consistency and flavor about on a par with a poor grade of toilet soap. The Guatemalan and Mexican avocados nearly all run high enough in oil to impart a flavor which will be satisfactory for general market purposes for a long while ahead. For strictly fancy trade, however, the matter of oil content, even among the Guatemalans, should be given careful attention by the prospective planter.

There is more difference of opinion among Florida growers as to the best color for a commercial avocado, than exists in any of the other countries where this fruit is produced. In California, where the markets were educated on the small thin-skinned Mexican avocados, which are nearly always very dark in color, the preference seems to be for a purple fruit and this also holds true in the markets of Cuba and other West Indian islands. The northern trade, which handles the output of our Florida avocado groves, has been largely developed to look upon the Trapp variety as a standard, and as

this is a green fruit, many dealers discriminate against avocados of other colors. The green avocado, which holds its color right up to the point of final decay, has the merit of presenting an attractive appearance to the customer as long as it is really fit to be offered for sale, but otherwise I cannot see that it has any advantage over the purple or yellow varieties, many of which are of the very best flavor. The main trouble with avocados having a mature color other than green is that they do not hold their color for any length of time. Some of the purple-fruited varieties, showing tints of color from bright red to dark maroon present a most attractive appearance just as they are approaching maturity, changing a few days later to a muddy brown which gives the fruit a look of decay while it is still perfectly fit to eat. The grower is entirely safe in selecting green-fruited varieties, as far as color is concerned, but personally I would not hesitate to plant a purple or bronze colored avocado, providing that I knew that the fruit would hold its shade for a reasonable time after removal from the tree. A color-line which would bar from commercial planting such fine varieties as Sharpless, Spinks, Queen, Linda, Atlixco and McDonald would have little to recommend it.

Mainly on account of packing requirements, the round avocado is preferable to any other shape, but has no great advantage over the oblong or oblate kinds. Varieties having a pronounced neck are rather objectionable. Other qualities being equal, the fruit



with a small seed is desirable, as the usual accompaniment of a small seed is thick flesh, but several of the best commercial varieties have seeds of more than average size.

As to the matter of size, opinions differ, but for general market purposes West Indian varieties averaging around a pound and a half and Guatemalans ranging from fourteen to twenty-two ounces in weight may be safely considered desirable. With a high class hotel or mail order trade larger sizes find ready sale but the tendency of the market demand is toward the smaller sizes and I believe that within a few years the Guatemalan varieties averaging about a pound in weight will net the grower the highest returns per crate. During the past two seasons Guatemalans ranging between ten and fourteen ounces, packing from four to six dozen to the crate, have sold readily during February and March at thirty dollars per crate f.o.b., I doubt whether a larger fruit would have brought better prices.

Briefly summarized I would enumerate the qualifications desirable in a commercial avocado variety as follows:

A tree, selected with careful regard as to the location of the planting, of such established bearing qualities as to insure fair crops each year or heavy crops on alternate years, and capable of carrying its crop through to maturity without serious set back.

A fruit maturing between October first and December fifteenth if of the West Indian type and between December first and May first if of the Guatemalan type. The fruit to be of me-

dium weight, free from fiber, with good oil content and small to medium size seed. Color preferably green or a "fast" shade of purple or bronze. Shape round, oblate or slightly oblong, without pronounced neck. And of all these qualifications that of producing sufficient quantities of fruit to warrant the raising is most important. For commercial purposes beware of the "shy" bearer, no matter what its other merits may be.

Mr. Niles: The only avocado experience that I can give would be what we have had in Polk county and Lucerne Park. In April of 1912, Mr. Gillett received a shipment of avocado and mango trees with which we planted and developed, five acres all together. The trees were planted on high, sandy soil. Some told us at that time that they would not do well in that class of land. They said they would do better near Orlando. However, we were willing to try them and determine whether they would be valuable or not. I will say this, that the trees made a wonderful growth; in fact, a great many growers in the different parts of the State called to see them, and were all surprised at the growth of the trees, not only the vegetative growth but also the size of the fruit. The trees fruited so well, and we got such high prices for them, that people began to have more or less of an avocado fever, so to speak. After banking the trees two years, we decided that we wanted to find out whether or not they would stand the cold, so we did not bank or protect them in any way during 1916 and 1917. We found out right away in 1917 what



they would stand. Some of these trees at that time were all of fifteen feet high, and fifteen feet in spread. While they were hit by the cold, it was not so bad as we thought at first; in fact, the trees have come back but are not as large as they were at the time of the cold, and are fruiting this year. A great many of those old stumps were budded and worked over to the different Guatemalan types, in fact, we have practically all of Popenoe's varieties which he brought from Guatemala and are testing them out there, and a great many have a very good setting of fruit this year. We have never ripened any fruit of the Guatemalan type that was important; I do not know of any being ripened in Polk county, but I think next year we will be able to tell you what results we have had with the fruits. Of course a fruit, having such excellent shipping qualities and also very delicious for use as a salad fruit, will command good prices on the market. Undoubtedly we are going to find trees that will stand, not quite so much cold as Mr. Beach mentioned in his paper, but will stand enough cold so that we can grow them in our section farther north. I will say in regard to the Mexican tree at Earleton, the man mentioned in his paper that the fruit was the size of cherries. I will say that with us, we have a Mexican seedling which has been planted four years in the ground and it

has fruit which are now larger than hen's eggs.

Mr. Rolfs: One point mentioned by Mr. Beach is that he thinks that fruit No. 133 has some Central American blood in it. I cannot agree with Mr. Beach on that. It is just an exact specimen of the one you have before you, the Winslow, a little smoother skin, and the odor and general looks of it are just like the Winslow. If it were of the same weight as the Winslow I think no one would think there was any Central or South American blood in it. Of course, the fact that it ripens early and is a very large fruit has no particular bearing on the subject, but may mislead someone into thinking that it has some of the South American blood in it. I just wanted to correct it as we are passing, as I don't think, from a close study of the fruit that we need to consider it as varying much from the Winslow.

Mr. ———: Mr. Chairman, I have two avocado trees among a large number that went through the freeze of 1917. These are the Fuerta and the Collins. The Trapp and four or five other varieties out of about six hundred trees we had, all froze to the ground. They were three-year-old trees at the time, and they all froze to the ground, but it didn't do these two particular ones any damage. They were loaded again last year.

# Insects Which Attack the Avocado in Florida

By G. F. Moznette, Bureau of Entomology, U. S. Department of Agriculture, Miami, Florida

There are a number of insects which attack the avocado in Florida, and their presence in excessive numbers at times may cause considerable concern to growers of this particular fruit. Avocados grown more generally at the present time in Florida are varieties of the West Indian type, although varieties of the Guatemalan type are fast gaining in popularity among growers, due to the fact that they will stand a number of degrees lower temperature than the West Indian varieties. Up to this time the Guatemalan varieties which are being propagated in nurseries and growing also in groves, have shown, that the same general type of insects which attack the West Indian varieties will adapt themselves to the Guatemalan varieties of avocados as well. It is interesting to note, that the important insects which may at times cause injury to the avocado in Florida, are different species from those which cause concern to the grower of citrus in Florida. Some of the insects which attack the avocado may have been introduced, while others may have already existed in Florida, and have adapted themselves to the avocado as a host.

Like most other fruits which have their particular scale insect pests, the

avocado likewise has its particular destructive scale insects. What the San Jose scale is to the apple and pear, and the red and purple scale is to the orange and grapefruit, the *Dictyospermum* scale is to the avocado in Florida. To describe the scale briefly, it varies from light grayish-white to reddish or amber-brown, and is circular or slightly elongated, and is about the size of the red scale which attacks citrus.

The sections where this scale is especially destructive to the avocado is in groves situated on the keys and stretches of land lying between the ocean and bay inlets, along the southern coasts of Florida. The writer has found that the temperature runs more evenly and averages a number of degrees warmer throughout the year in these localities than on the mainland, which, perhaps, accounts for the abundance of the scale in those places. It is, however, often present in groves located on the mainland, doing damage, and is to be found in varying numbers in nearly every place where the avocado is growing in southern Florida. The scale is a pest in avocado nurseries, and especially finds protection where the trees are crowded together in rows and blocks. It has been found



by the writer to infest both the West Indian and Guatemalan varieties of avocados.

Where this scale is present in an avocado grove it does not attack the fruit but confines its attacks to the twigs and branches. The twigs and branches attacked are gradually weakened and ultimately become of little use to the tree. Where this scale is present in numbers the branches infested soon become roughened and crack considerably affording entrance places for various fungi.

This scale may be controlled in the bearing grove and nursery by spraying with oil emulsion at the rate of one part of oil emulsion to seventy parts water during the dormant season of the year. Care, however, should be taken in spraying with an oil emulsion where a "hard" or brackish water is employed to see that no separation takes place during spraying, as a great deal of the efficiency of the spray is lost in this way, and the free oil is liable to cause defoliation. Unfortunately in most sections where avocados are grown, the waters used for spraying purposes come from wells in limestone formation, and are, as a rule, "hard," and from surface wells along the ocean which are as a rule brackish. In spraying, the twigs and branches of the trees should be thoroughly covered.

Another pest of importance is the avocado red spider. On the approach of dry weather in the fall of the year the avocado red spider becomes very active, and often gives great concern to the grower. Especially is this true

where trees are more or less neglected. Usually the injury caused by red spiders shows rather suddenly in a grove, the owner usually realizing the damage when it is too late. It is of great importance that growers of the avocado should not wait until the trees are browned as if scorched by fire, but their presence on the green foliage should give sufficient concern to start spraying.

The red spider is to be found infesting a number of plants in Florida, among them is camphor, and has particularly adapted itself to the avocado. It may be distinguished somewhat from other red spiders which attack various other fruit trees in that it confines its attacks to the upper surface of the foliage entirely. The foliage attacked turns brown and drops prematurely, and frequently there is a heavy denudation as a result of their attacks. The writer has observed that where the red spiders are allowed to have their own way and cause premature defoliation, that the trees so attacked generally bear less fruit than if the red spiders were controlled.

To control the red spider the trees should be sprayed when they become noticeable on the green foliage, by spraying with lime sulphur at a strength of 1-50. Subsequent applications will depend upon the judgment of the grower. He will spray as often as is necessary according to the weather conditions, and the activities of the pests during the winter season, to keep his trees free of the spiders. Where the red spiders are numerous, usually two sprayings, at a three or four week in-



terval during the dormant season should be sufficient to keep them under control.

A thrips which often attacks the avocado in the open in southern Florida is known as the greenhouse thrips because it attacks various plants under glass in the northern states. This thrips, which is dark brown in color, attacks the foliage of the avocado and is usually present on the trees at the time the red spiders are plentiful. When numerous they may also attack the fruit giving it an unsightly appearance. They work very rapidly on the foliage, and have been observed on a number of occasions to cause excessive defoliation to trees in a short length of time. Where this thrips is present at the time the red spiders are troublesome, they may be controlled by incorporating Black Leaf-40 into the lime sulphur at the rate of 1-900 parts of the diluted lime sulphur solution, or where present alone, may be sprayed with Black Leaf-40 at the rate of 1-900 with two to three pounds of fish oil soap added to the tank to cause the spray to spread more evenly over the foliage.

Like citrus the avocado also possesses its particular white fly in Florida. It is somewhat smaller in size than the citrus white flies and possesses a yellow body with white wings. It is present in nearly every locality where avocados are growing in Florida, but evidently is likewise sensitive to varying changes of temperature as regards its activities and numerical numbers in groves and nurseries in different localities. It also prefers the localities where

the trees are protected and the temperature runs quite evenly. The work of this white fly is similar to other white flies which attack citrus, in that it attacks the foliage and produces an abundance of honey dew in which the sooty mold develops on the leaves, fruit and branches.

By spraying with an oil emulsion at the rate of 1-70 as is used against the Dictyospermum scale during the dormant season will help considerably to check the ravages of the white fly. In spraying for the white fly it is likewise important that no free oil separation occurs during spraying with oil emulsions. In the case of the white fly the sprays should be so directed as to reach the lower surface of the foliage.

A species of thrips which attacks the avocado during the blossoming period is a species similar to the thrips which attacks citrus in the bloom only it is somewhat lighter in color. The species is known to occur in Mexico and has recently been reported in this country. It is present in southern Florida where it lives on many species of plants during their blossoming periods. As soon as the avocado commences to bloom it appears in the groves. In attacking the bloom it deposits its eggs in great numbers in the spikelets and other parts of the stems supporting the bloom. The thrips often so severely attacks bloom in a grove as to seriously weaken the supporting stems which bear the fruits. Where injury is extensive it may possibly seriously interfere with the setting of the fruit in a grove, and which may be true where the bloom is weak.

Where this thrips is present and doing damage, the trees should be sprayed when the bloom is about one-third out with Black Leaf-40 at the rate of 1-900 with from two to three pounds of soap, preferably fish oil soap, added to the tank to cause the spray to spread more evenly. Where red spiders are still present at this time of year the Black Leaf-40 may be incorporated in lime sulphur 1-50.

This in a popular way cites what important insects at the present time may be found in avocado groves in Florida. However, like all fruit industries in which new pests appear and cause concern to the fruit grower, as the avocado industry develops extensively other pests may possibly make their appearance and prove injurious.

# Some Diseases of the Avocado and Other Sub-tropical Fruits

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H. E. Stevens, Florida Agricultural Experiment Station, Gainesville.

When there are so many pleasant features that might be considered in connection with the production of avocados and sub-tropical fruits in Florida, I feel somewhat reluctant to present the darker side of the picture. However, it has fallen to my lot to give you a list of some of the troubles that the producer of these products is more than likely to come in contact with, and to point out some of the disagreeable experiences that are apt to result.

I assure you it is not my wish to dampen your enthusiasm for fruit growing in Florida and I hope I will not be accused of presenting a pessimistic outlook for the future. There are certain cold hard facts that we cannot get away from and one is, that practically every cultivated plant we grow, whether fruit, vegetable or flower, has one or more enemies bent on its destruction.

The object then of this paper is to put you on guard as to what you might expect in the way of troubles and to advise you as far as possible how you may avoid some of these. Forewarned is forearmed and the successful fruit grower of today must be fully armed for any occasion. Knowledge of the

best varieties to plant, the best location to select and the best fertilizer to apply is not sufficient alone to insure success as a fruit grower. These are only successive stages in the production of a crop. There are still insect pests and plant diseases to be reckoned with before the crop matures, and these are often the deciding factors in the production of a satisfactory crop. A fine healthy tree may be produced with little difficulty, but to mature a profitable crop on this tree is sometimes another question. So it is important for the one who wishes to grow fruits or other crops with any degree of success to know something of the enemies that attack these crops and the methods employed to avoid them.

A great many of our farmers, gardeners and fruit growers rarely think about diseases until their crops are attacked by them and then it is usually too late to repair the damage done. It is just as necessary to know what diseases a tree is likely to have as it is to know the kind and quality of the fruit it produces. With many of our fruits it is just as certain to expect them to be attacked by a particular disease at some period of their devel-



opment as it is to expect the crop to mature. These are things that should be known and remembered, and long before this particular disease appears remember that certain measures for control must be taken to avoid it. Do not delay with the expectation that probably this season you will escape for you may be sadly mistaken. A great many of our common diseases are so well distributed that we find them well established everywhere that cultivated fruits are grown and where this is true, it is reasonable to expect more or less trouble from diseases each season. It should be kept in mind then that certain control measures are necessary each season to avoid such diseases, and that these measures must be applied at a certain time to be effective. Prevention is by far the most economical method of handling diseases and to do this effectively one must have some knowledge of the cause and nature of the trouble in addition to the methods employed for its control.

In order to assist the fruit grower in understanding and becoming better acquainted with some of the various troubles he may meet with, the more important information concerning some of the common diseases occurring on the avocado, mango, guava and papaya has been brought together in this paper. In the discussion under each disease the appearance of the injury is described, the cause, if known, is given and such other information as concerns the distribution and conditions under which the disease occurs. While a large part of this

information has been collected from other sources, much of it is the result of personal investigation and observations on the diseases mentioned.

### Avocado Diseases

The list of avocado diseases continues to grow longer as the progress of our investigations along this line advances. This does not indicate that new diseases develop spontaneously each season, but rather that we are bringing to light those that may have been here for some time and that we are eliminating some of the confusion existing about others. With the rapid growth of the avocado industry during the past few years there has been a better opportunity for the distribution and development of some of the diseases that have been in the background in the past. We are just becoming familiar with some of these at present time. We may still find more diseases and serious ones but the sooner this is done it will be better for all concerned.

At the present time the following diseases may be found on the avocado in Florida, namely, Scab, Black Spot, Blotch, Powdery Mildew, Rusty Blight and Russet Fruits. Not all of these are fatal but a few have proven rather serious troubles during our short acquaintance with them.

#### AVOCADO SCAB

This is a foliage and fruit disease that has developed in Florida within the past few years. It was reported and described by the writer in Press

Bulletin 289, Florida Agricultural Experiment Station, 1918, and also reported in the State Horticultural Society Report for the same year.

Scab is probably more troublesome in the nursery on young plants where it has proven difficult to control. It is more common as a foliage trouble on seedling plants, however, many of the budded varieties are susceptible to Scab. During the past two seasons the disease has been noted severely affecting the fruits of both seedling and budded varieties of the avocado. The fruits of the Trapp and Taylor appear to be rather susceptible to Scab and the disease is likely to be a serious factor in the production of these varieties. Scab, however, does not affect the interior of the avocado, but the outward appearance of the fruit is marred, and as the market becomes more discriminating for perfect fruit, the effect of Scab will undoubtedly be more evident. It is also probable that the disease is responsible for a considerable shedding of the fruit, where severe infections occur just about the time the fruit is setting.

### *Appearance*

The disease forms definite spots or patches on the young tender leaves and shoots and severe attacks may cause the affected leaves to curl or become distorted. Infection takes place only on young tender growth and as the leaf tissue hardens it becomes immune to the disease. However, the older leaves will frequently be found bearing Scab spots that were formed when the

tissue was young. The spots are generally small, circular to irregular in outline and they vary from one-sixteenth to one-eighth of an inch or more in diameter. They are purplish brown to dark in color and may appear scattered over the surface or several may grow together forming irregular areas. The spots penetrate the leaf tissue being visible on both sides of the leaf. They are usually more prominent on the upper surface of the leaf in which case the under surface of the spot may be slightly bulged and marked by a purplish discoloration. The centers of the older spots are composed of dry, dead cells, more or less spongy and brownish in color. Sometimes the dead center tissue falls away leaving a small hole in the leaf. In the early stages of development the surfaces of the spots may show a whitish growth, the fruiting parts of the fungus. As the spots grow older the surfaces become brown or black due to invasion of other fungi.

On the young shoots, twigs and leaf petioles, the spots appear darker and more elevated. They are more or less oval in shape with comparatively smooth surfaces and in general outline may resemble one of the soft scale insects.

On the fruit the same oval-shaped, raised type of spot occurs that is found on the twigs. The spots may be scattered or clustered together forming an irregular scabby mass. Severe infections on fruits frequently cause a roughened or russet appearance similar to the effects of Citrus Scab on grapefruit. In this case the markings



are light brown in color. The quality of the fruit is not affected by Scab, however, the appearance is marred and fruits badly attacked are undersized and misshapen.

#### *Cause*

Avocado Scab is a fungus disease. The fungus has been isolated from the diseased spots on leaves, studied and identified as *Cladosporium citri* which also causes the Scab of citrus plants. The fungus from Avocado Scab appears to be identical with the fungus from Citrus Scab and it will produce typical Scab infections on the tender growth of either citrus or avocado. However the writer has not succeeded yet in producing typical Avocado Scab with the strains of the fungus isolated from Citrus Scab. Only a limited number of attempts have been made up to the present and all of these have given negative results. It is probable that all strains of *Cladosporium citri* are not pathogenic to the avocado but that certain strains have recently adapted themselves to this host. Such strains are parasitic to both avocado and citrus. *Cladosporium citri* has the habit of passing from host to host in the citrus group and it may follow the same trend with the avocado. Many varieties of the avocado and even individual plants show a marked resistance to Scab, but it might be only a question of time until all of our prominent varieties are susceptible to this disease.

In certain sections the disease is so well established that the growers will be compelled to rely on control measures rather than to attempt eradica-

tion. In localities where the disease does not occur precautions should be taken against its introduction.

#### *Control*

The control of Avocado Scab will divide itself into two phases; namely, control of the disease in nurseries and control of the disease on fruits. The control of the disease in the nursery seems to be the larger task and as yet probably a beginning has only been made. Thus far we have not been situated so that we could conduct a satisfactory experiment of this nature. Some of the nurserymen have tried out spraying for the control of this disease with varying degrees of success. Apparently ammoniacal solution of copper carbonate gives a greater degree of efficiency than Bordeaux mixture for the control of Scab on nursery stock, and one large avocado nursery in the State relies on this fungicide to keep their stock clean.

As a means of controlling the disease in the nursery the following outline may be suggested. If the old leaves are badly affected with Scab, spray thoroughly with Bordeaux mixture, 4-4-50, before any new growth puts out. The object of this spraying is to thoroughly cover the Scab spots and catch any accidental spores that may be on the foliage. It is merely a clean-up spray. When the new foliage begins to put out, spray with ammoniacal solution of copper carbonate and follow every week or ten days until the new growth hardens. This schedule of spraying may have to be re-



peated throughout the season whenever new growth appears.

For the control of Scab on fruits, probably Bordeaux mixture will give satisfactory results. The first spraying should be made into the bloom about the end of the blooming period, using 3-3-50 Bordeaux mixture. A second spraying should follow a month later and a third one month after the second, using the 3-3-50 Bordeaux mixture in each case. This is only a tentative schedule and may be subject to change, depending upon the results of an experiment we are conducting this season for the control of Scab on fruits.

#### AVOCADO FRUIT SPOTTING

Under spotting may be included several types of injury on the avocado other than Scab. One characteristic type of spotting was reported before this Society in 1918. This was temporarily referred to as fruit spotting until the cause could be established and more recent investigations seem to place it among the anthracnose. Since anthracnose has been previously used for another and different type of injury on the avocado and in order to avoid confusion, the name Black Spot will be used to designate this disease in the future. It was previously designated Black Spot by Mr. Hamilton Michelsen, of Miami, and many of the avocado growers recognize the disease by this name.

#### BLACK SPOT

This is a serious trouble on the seedling fruits in certain sections of the

State, and occasional specimens have been observed on the budded variety Trapp. So far the disease seems to be confined to the lower East Coast and during the past two years it has caused serious injury to the seedling crop in that section. In some cases ninety per cent or more of the fruits on a tree will show the disease and the greater part of the infected fruits are worthless for shipping purposes. Some seedling fruits show a considerable degree of resistance to the disease while others are highly susceptible. It appears on fruits that are approaching maturity, forming a characteristic spot that is easily recognized.

#### *Appearance*

The injury appears in the form of definite spots scattered over the surface of the affected fruit. These spots are round, brown to dark brown or black in color, and vary from one-eighth to one-half of an inch in diameter. They are composed of hard, dry, corky tissue which penetrates the skin of the fruit down to the meat. The surfaces of the spots are slightly sunken, often cracked or fissured, and in some cases a zonated effect is observed. When once formed the spots do not appear to increase in size on the surface of the skin, but a decay of the meat below may follow, especially in the ripened fruits. Affected fruits may show from a few to many spots of various sizes and frequently spots grow together forming irregular patches, the surface of which is deeply cracked or broken. Severe at-

tacks on less mature fruits may cause them to become misshapen or undersized.

#### *Cause*

The spotting is caused by a fungus, a species of *Colletotrichum* which has been repeatedly isolated from the diseased tissue of the spots. The fungus has also been inoculated into healthy fruits and in several instances it produced spots typical of those formed under natural conditions. The fungus also forms spots in the dark green bark of young shoots and on fruit stems, very similar to the spots produced on the fruit. Spots on the fruit stems are generally evident some time in advance of infections on fruits. Another fungus which is yet unidentified is often found associated with this *Colletotrichum* in the spots, but all attempts to produce infection with this fungus have given negative results.

#### *Control*

No definite system of control for Black Spot has yet been worked out, however, experiments are in progress this season with that end in view. Preliminary spraying experiments with Bordeaux mixture, ammoniacal solution of copper carbonate and lime sulphur made last season gave negative results in the way of control, but this was largely due to the fact that the sprayings were made too late in the season to prevent the disease. It is probable that Bordeaux mixture will readily control the disease if the spraying applications are made before the fungus gains entrance to the fruit.

This may necessitate two or three sprayings, beginning when the fruit is about one-third grown and continuing at monthly intervals, or less, until the fruit is nearly mature.

#### AVOCADO BLOTCH

During the investigation of the Black Spot disease another type of spot has been observed which is quite different from Black Spot, although the two are generally found together. This type of spotting will be referred to as Blotch, a name suggestive of its general appearance. Blotch frequently precedes Black Spot and on certain individual trees it is more prevalent and more serious. Thus far it has only been observed on seedling fruits, and quite often the entire surfaces are affected with the disease. Spots of the Blotch type are smaller and much more numerous than those of Black Spot, and they usually develop earlier than the latter. Both types may be found at the same time on a single fruit.

#### *Appearance*

Mature spots of this type appear as small, slightly sunken, irregular blotches, usually black in color, but often showing a white fuzzy fungus growth at the centers. Fully developed spots may vary from one-eighth to one-fourth of an inch in diameter. The beginning of such spots are indicated by pale green areas, showing one or more brown or black spots, smaller than a pin head. Gradually the pale green areas become brownish to black and develop into irregular sunk-

en areas typical of Blotch. These spots may be scattered freely over the surface of the fruit or several may run together forming irregular black patches. Black Spot often develops in the same areas occupied by Blotch.

#### *Cause*

The disease is apparently caused by a fungus which appears in one form as a **Cercospora**. This is the type of spore produced in the white fungus growth on the surface of the spots. From the interior of the spot a dark fungus mycelium has been repeatedly obtained which appears to be identical to that produced by germinating the **Cercospora** type of spores from the surfaces of the spots. The complete identity of this fungus has not yet been established, for when grown under laboratory conditions it has failed to form spores by which it might be classified. Our efforts to make it fruit in pure cultures have not been successful up to the present. The parasitic nature of the fungus has not been demonstrated yet since all inoculations into fruits have given negative results. However, the dark fungus mycelium has been repeatedly isolated from Blotch Spots in various stages of development and the constant association of this fungus with the type of spot would suggest it as a possible cause of the disease. Perhaps another spore form is produced on some other part of the tree which may be responsible for the beginning of the Blotch type of spot.

#### *Control*

The control of Blotch will follow along the same lines as that of Black Spot. Both diseases occur at the same time and under practically the same conditions and the method of control employed for one should serve for the other.

#### POWDERY MILDEW

This is a foliage trouble that has been observed on several occasions during the past few years on both young and old trees. It is probably not a serious pest especially on bearing trees, however, it might become troublesome in the nurseries or on young trees located in damp shaded situations. It is a fungus disease and should yield readily to proper treatment.

#### *Appearance*

Attacks on young trees may result in the killing back of the tips of the tender shoots. The affected terminal leaves may show a dark watery discoloration on the upper surfaces, along the mid-ribs, and they may be curled or dwarfed. From one-third to one-half of the leaf tissue may be affected with the disease. On the under surface of an infected leaf the same dark, watery area is visible and this is generally covered with a white powdery fungus growth, the spore bearing parts of the fungus. On more mature leaves large, irregular spots or blotches occur on the under surfaces, varying from one-half to an inch or more in extent. These spots have a purplish cast, or



they may also show the white powdery fungus growth. They are rather characteristic on account of the network or vein-like appearance of the affected areas. The spots are not prominent on the upper surfaces of the more mature leaves but may be faintly outlined by pale green areas.

#### *Control*

While no control experiments have been tried out for this particular disease, like most of the powdery mildews, it should yield readily to the sulphur treatment. Spraying with lime-sulphur solution, 1 to 30, should keep the disease in check, or probably dusting with powdered sulphur would be equally as effective. Where only a few small plants are involved the dust method may be employed to advantage. Where the disease occurs to any extent in the nursery two or three applications of lime-sulphur solution at intervals of two weeks apart should keep the disease under control.

#### RUSTY BLIGHT

This is a fungus disease that has proven quite troublesome on the avocado in Hawaii, and it may occur to some extent here in Florida. It is found chiefly on the foliage and young branches, however it may also attack the bloom and immature fruit. In habits it corresponds very closely to Withertip on citrus. A species of *Gloeosporium* has been identified as the cause of the disease.

#### *Appearance*

Infected leaves turn rusty brown and the affected part is often marked by concentric circles of lighter color showing the progress of the fungus. The leaf may be attacked in any part of the blade, the disease spreading rapidly until a large part of the tissue is invaded. Leaves thus affected later fall, and in severe attacks the tree may be nearly defoliated. The fungus may pass from an infected leaf into the young twig, killing it back.

Affected branches become dark in color and may continue to die back carrying the disease into the large parts of the tree. The bloom may also be attacked and it is often through the infected flowers that the disease gains entrance to the young twigs. It is probable that in severe attacks the fungus causes an excessive dropping of the newly set fruit.

#### *Control*

Attacks on leaves, bloom and fruit may be kept down by spraying with Bordeaux mixture, 4-4-50 formula. As soon as the trouble appears an application of the spray should be made. Other applications should follow at weekly intervals until three or four sprayings are made. Any dead or sickly branches should be removed from affected trees to prevent further progress of the disease in the healthy branches.

#### RUSSET FRUITS

Russetting of avocado fruits is not uncommon, and varying degrees of in-

jury of this nature may be observed each season. Such injuries are probably the result of several causes and no doubt some of it is mechanical injury, due to the young fruits rubbing against the twigs and branches of the tree. Thrips are probably responsible for a certain amount and perhaps certain fungi are concerned with the development of the remainder.

There is one type which is rather striking and which may be the effect of fungus injury, however, as yet the cause is unknown. This resembles very closely in outward appearance the Melanose injury of citrus fruits and it may be caused in a somewhat similar manner. The surfaces of badly affected fruits are thickly studded with small, hard, brown, angular spots that are raised above the surrounding tissue. This gives the fruit a roughened surface similar to that of coarse sand paper. The streaks, bands and circles characteristic in Melanose of citrus fruits are absent, but large caked masses are found with hard glazed surfaces that finally crack, forming the small angular spots. Slight attacks may show a scattering of spots more or less circular in shape distributed over the surface of the skin, or the spots may occur in broken or irregular lines. The injury is confined to the surface of the fruit and does not penetrate deep into the skin. Apparently the meat is unaffected and no decay has been observed following this type of injury. Fruits thus affected are often misshapen or undersized, and of course the outward appearance is completely marred.

Other types of injury occur as dark brown, hard, glazed spots or streaks extending across the fruit. The surfaces of such injuries are smooth and unbroken and raised above the healthy skin. They may vary from a fourth to a half inch or more in width and streaks may be observed two inches or more in length. They appear to be the result of mechanical injury. The writer has produced similar areas on the avocado by slightly scratching the surfaces of immature fruits with a piece of sandpaper. Thus any bruising or scratching of the surface of the fruit during its early period of growth would result in an injury of this character. This condition is frequently observed where two or more fruits come together in a cluster. Irregular blotches and areas have been noted from time to time on the surfaces of fruits that are suggestive of thrips injury found on the surfaces of citrus fruits.

### Mango Diseases

The growing of mangoes from a commercial standpoint is becoming more important in Florida and the development of this industry even for local consumption has excellent possibilities. Aside from the culture, proper varieties to grow and possible markets for the fruit, the grower of mangoes must also reckon with the disease and insect phase of the subject. This may prove to be the larger task.

Anthracnose at the present time is the bane of the mango grower, and this disease is generally the limiting factor in the production of the crop in



this State. Unfortunately no satisfactory practical remedy has yet been found for the complete control of this disease, however, spraying with fungicides affords some measure of relief. This is a problem that needs further investigation and one that must be solved if the mango industry is to develop to the state it should here in Florida.

#### MANGO ANTHRACNOSE OR BLIGHT

This disease is caused by the fungus *Colletotrichum gloeosporioides* which is a well known offender and it has a wide distribution throughout the State. This same fungus attacks citrus causing Withertip, Bloom Blight, Anthracnose, and other injuries in the groves, and it is commonly found on a large list of plants native to Florida. Thus, in any locality where the mango is grown the fungus is almost certain to be present in abundance.

The mango has proven to be a desirable host for the fungus and under favorable weather conditions its destruction is rapid and complete. The bloom seems to be more susceptible to the disease and in severe attacks trees may fail to get a single fruit, owing to the complete destruction of the bloom. This appears to be the worst phase of the disease to combat, the injury to the bloom. The fungus attacks the leaves, flowers, twigs and fruits. Young leaves are quite susceptible and infections first appear as small blister-like spots. This stage is followed by the blackening and destruction of the leaf tissue resulting in the death of the fo-

liage. Flower clusters that are severely attacked soon turn black and drop the flowers or wilt so that the whole top of the tree may present a blackened appearance, suggesting the name Blight. On the more hardened tissue of the flower and fruit stems and tender twigs, the disease appears as small blackened spots. On fruits blackened spots or areas are formed which greatly mar their appearance and as such fruits mature these spots result in a decay of the flesh beneath.

#### *Control*

The production of a good mango crop in Florida will depend largely upon the condition of the weather during the time of blooming. If the weather is cloudy during this period accompanied by rain or heavy dews, very little can be done to prevent Bloom Blight which is the most serious form of the disease. Bloom Blight apparently does not yield to spraying since it is not possible to protect all exposed parts of the flowers as they open, even by the most careful spraying. The fungus spreads rapidly under moist conditions and the open bloom affords an easy entrance for the disease. If the weather is clear and dry during the blooming period a sufficient amount of fruit will usually set. This may be protected from spotting during the early stages of the development by several applications of Bordeaux mixture.

Where Anthracnose is troublesome each season it is probably advisable to use Bordeaux mixture to protect the



bloom buds until they begin to open. This will reduce the amount of disease on flower and fruit stems, and give the fruit a better chance to escape early infection. Probably three sprayings of the flower clusters before the bloom opens will be ample to keep the fungus in check. The first application of Bordeaux mixture should be made when the buds are just swelling, and subsequent applications at intervals of four or five days apart until the flowers begin to open. The 4-4-50 Bordeaux formula may be used. After the fruit has set it should be kept covered with Bordeaux mixture during the first eight or ten weeks of its development. Fruits seem to be more susceptible to the disease just as they are setting, and the first spraying should be made in the last part of the bloom period. A second spraying should follow a week after the first, and a third a week later, and a fourth two weeks after the third. If the weather is damp and cloudy during this period a fifth spraying may be necessary three weeks after the fourth application.

Dead and sickly wood should be kept pruned out of the trees and where the disease is severe, the fallen leaves and rubbish under the trees should be cleaned up and burned. A few sanitary precautions may go a long way toward helping to keep the disease in check.

A few other diseases of the mango, such as leaf spots and fruit injuries, have come to our attention from time to time but these have not been given sufficient study to determine their causes.

### Guava Diseases

The production of guavas has its place in the fruit industry of Florida and we may look for continued development along this line to meet the growing demands for the jelly and other products for which the fruit is noted. At the present time guavas grow wild in certain parts of the State, but in the future as the demand increases they may be cultured and cared for as any other fruit crop. With this in view it is well to consider the diseases that are likely to affect the guava here in Florida. There are only a few diseases reported on this fruit and none of these have become a serious menace to our guava crop as yet. Ripe Rot or Mummy Disease is probably more widely known and it has been reported as occurring to some extent in the State. It has become a serious trouble on the guava in Porto Rico and our Florida climate would appear to favor the development of the disease here. Other types of injury on leaves and fruits have been observed occasionally but these appear to be local troubles or diseases of minor importance. Fortunately, the guava seems to have escaped many of the serious ills that afflict our more famous fruits. Whether this is accidental or due to the fact that no one has taken enough interest to inquire into the diseases of the guava I am unprepared to say. It appears, however, that with a little spraying and an occasional pruning of the trees, the guava crop can be matured without any serious amount of loss.

### RIPE ROT OR MUMMY DISEASE

This is a fungus trouble belonging to the group of Anthracnoses which are well represented among our various fruit and vegetable crops. It is caused by the fungus *Gloeosporium psidii*. While the disease has been reported from Florida no statement has been seen as to the probable amount of damage it does to the guava crop in the State. The writer has observed occasional specimens of the disease but has not seen it abundant enough in any one locality to cause any serious concern. The disease attacks the ripening fruit causing it to rot, shrivel and dry up on the tree. The first indication of the trouble is the appearance of brown spots on the surfaces of the ripening fruits. These spots continue to increase in size until the entire fruit is decayed. The surfaces of the brown spots may show a pinkish coloration due to the spore masses of the fungus. The decayed fruits finally shrivel, become dry, and cling to the tree as mummies. It is probably by this means that the disease is carried over from season to season.

#### *Control*

Where the disease is troublesome certain measures can be taken to prevent it. All shriveled or mummified fruits should be removed from the trees and destroyed some time in advance of the new crop. Probably two or three applications of ammoniacal solution of copper carbonate applied before the fruit begins to ripen will readily control the disease. The first

spraying may be made when the fruit is half mature or more and the spraying should be continued at ten-day intervals until the fruit ripens. The ammoniacal solution of copper carbonate will be preferable to Bordeaux mixture for this purpose since it will leave no objectional stain on the mature fruit.

### ALGA LEAF SPOT

A leaf spot of the guava is sometimes found on bushes growing in moist shady situations. It is caused by a species of Alga but does not appear to be anything of a serious nature as far as the guava is concerned. The development of this spotting is chiefly influenced by shade and moisture and as yet it has not been observed in sufficient abundance to cause serious injury to the foliage. However, under certain conditions it may become a troublesome pest. The disease appears as distinct, round, flattened spots, one-fourth to one-half an inch in diameter, scattered over the surface of the leaf. The spots are raised and first appear orange red in color, but later change to a greenish cast. If a considerable part of the leaf tissue is covered with such spots the leaf may fall and severe attacks of the disease may cause considerable defoliation.

Where control measures become necessary two or three applications of Bordeaux mixture at ten-day intervals should keep the disease in check.

### Papaya Diseases

Two diseases are reported on the papaya, that might be of interest to

the growers of fruit in Florida. These are Leaf Blight or Leaf Spot and Foot Rot, both of which are fungous troubles. Foot Rot is a newly described disease from India which may not occur with us as yet. Leaf Blight however, has been found in Florida in a few localities this season and it may have a wider distribution than we suspect at the present time.

### LEAF BLIGHT

This is a fungus disease of the leaves caused by *Pucciniopsis caricae*. It was found some years ago on Sanibel Island, Florida, but considered of minor importance at the time. This spring, however, the disease was observed at several points on the main land and in some cases the trouble appeared suddenly and seemed to spread rapidly. Specimens showing Leaf Blight were received first from St. Cloud, Florida, and later the disease was noted around Miami and farther south in Dade county. It has been reported from Porto Rico, Cuba and British Guiana. In Porto Rico, Leaf Blight frequently causes serious injury to the younger plants, resulting in almost complete defoliation in cases of severe attacks.

### *Appearance*

The disease is striking and easily recognized by the black pustular spots on the under surfaces of infected leaves, suggestive of Sooty Mold. On the upper surface of the leaf the infected areas appear as brown circular spots distinctly outlined. The spots are usually small varying from one-eighth

of an inch to mere dots. From a few to several hundred spots may be present on a single infected leaf.

Infections on the under surface of the leaf are represented by black round masses, called sporodochia, which are raised slightly above the leaf tissue and bear the spores of the fungus. The small, brown septate spores of the fungus are found abundantly in these black masses and it is by means of these spores that the disease is spread. They may be blown by the wind or carried by insects for considerable distances.

Severe attacks of the disease may cause defoliation of the plants, resulting in death or a very much weakened plant.

### *Control*

Very little attention seems to have been given this disease in the past especially in regard to control measures and such recommendations as can be suggested at the present time are only tentative.

If the disease is discovered in time it can probably be easily controlled by the use of Bordeaux mixture. Three or four sprayings at intervals of ten days to two weeks apart with 3-3-50 Bordeaux mixture should put down a mild attack. In this case the object should be to keep the slightly infected leaves covered with Bordeaux to kill any spores produced on the surfaces and the new leaves well protected during their tender period of growth to prevent new infections. Both under and upper surfaces of the leaf should be thoroughly covered with the spray. In cases of severe attacks all of the



older infected leaves should be removed and destroyed. The remaining foliage should be thoroughly sprayed with Bordeaux mixture at weekly intervals until the new leaves that put out are entirely free from disease. If the badly infected plant is a small one it will be more economical to destroy it and start with a healthy plant.

Seedling plants should be closely watched especially if they are grown in the vicinity of old plants carrying the disease. Frequent applications of Bordeaux mixture may be necessary to protect the seedlings from infection. When Leaf Blight appears efforts should be made at once to eliminate it as soon as possible.

#### Foot Rot

Foot Rot is a newly described disease in India where it is reported as troublesome during the rainy season, killing bearing plants or so weakening them as to cause reduced production and undersized fruits. The disease is more common on bearing plants two or three years old and it is rarely found on young seedlings. It is caused by a fungus which has been identified as *Pythium butleri*. Whether this fungus occurs in Florida or not is unknown at the present time. It belongs to a group of soil fungi noted for causing Damping Off and decay of plants at the crown or in the root system. Damping Off is a common trouble in Florida with many of our vegetable plants and a species of *Pythium* is one of the principal causes of this malady.

#### *Appearance*

Foot Rot appears usually at the surface of the soil and the first indications of the disease are marked by a patch of soft watery bark at the base of the plant. A copious flow of milky juice exudes from the affected tissue, which turns brown and coagulates on exposure to the air. The disease may continue to spread from a small area until the trunk of the plant is girdled or nearly so and the bark tissue is rotted down to the hard woody tissue. This finally becomes discolored and a foul odor is usually associated with the decay. The disease may extend up the trunk a foot or two and it is more active and spreads rapidly as long as the weather is damp and rainy. Foot Rot is chiefly a "rainy season" disease and it is rapidly checked when dry weather follows. The severity of an attack will depend upon the period the disease has to develop during favorable weather. A plant may be killed in one season or it may take a much longer time depending upon the rapidity with which the disease invades the bark tissue. A plant that is girdled soon dies, however large areas of the bark may be invaded and the plant still live, but very much weakened. Again attacks may do little or no harm if infection takes place near the end of the rainy season.

We do not know how this disease might behave under climatic conditions in Florida and it is worth while to guard against its introduction or distribution among the plantings we have in the State.

### Control

The following method of control has been suggested. The diseased bark should be cut away as soon as the trouble is observed and the wound should be painted over with some antiseptic covering. Crude carbolic acid, carbolineum, or pine tar may be used for this purpose but such should only be applied to the cut surfaces. The diseased bark cut away should be col-

lected and burned and not allowed to remain at the base of the plant. This material contains the fungous parasite which may get back into the soil and form a source for reinfecting the plant.

If taken in time the disease can be checked without much injury to the plant. If, however, the plant is nearly girdled before the disease is discovered, very little can be done to repair the damage.

# The Pineapple Industry in Florida and Its Future

H. S. McLendon, St. Augustine

In referring to the records of the Florida State Horticultural Society I find that the pineapple has been discussed a number of times before this Society and from several different angles or viewpoints.

We do not intend to attempt to make this a scientific paper. We have tried to get as much information as possible from the growers who have been growing pineapples for a number of years. Some of these men were among those who started with the industry when it was small and were with it during its best days and are still staying with it during the desperate effort that is being made to revive the industry.

The ideas of these men vary considerably. We are, therefore, obliged to draw our own conclusions, assuming that they are correct, at least, until they are proved otherwise.

We will not dwell at length on the early history of this industry. Pineapples in Florida seem to have been first planted on the east side of the Indian river opposite Titusville at Cape Canaveral in 1881. The next plantings were developed at Eden where the crop first developed into a commercial industry. In 1889 there were probably a few hundred acres in this locality. The plantings were ex-

tended from these fields on the sand ridge, both north and south of Eden until in 1905 there were shipped from the East Coast territory 370,688 crates.

Up to the present we have been referring to only one region in which pineapples were grown, for that is the only region in which the crop developed into a large commercial output. There was only one variety grown on a large scale in the East Coast region, that being the Red Spanish.

There were other places in Florida where pineapples were produced in a commercial way; however, most of the shipments were made by express or the fruit was sold locally. During the years between 1890 to 1900 at Orlando, Winter Haven, Ft. Myers and probably other places in the State there were several men growing pineapples. However, at several of these places the plants were grown under shelter or slatted sheds. The varieties that were generally grown under these conditions were Smooth Cayenne, Abbaka, Golden Queen, Porto Rico, Enville City and probably several others with some Red Spanish.

At present the only place in the State, other than the East Coast, where pineapples are being grown in any commercial way is DeSoto county near Punta Gorda where there are several



fields of Smooth Cayenne. Most of these are under sheds and total only twenty-seven acres.

Referring again to the Red Spanish variety and the East Coast, as I previously stated, the industry in this territory became a commercial one about 1889 and had grown to where in 1905 there were 370,688 crates shipped. This output grew rather fast until 1909 when there were 1,110,547 crates shipped. From this year the industry has been falling off until in 1918 it reached the lowest figure, in that year there were not to exceed 25,000 to 30,000 crates. For the year 1919 there was something less than 50,000 crates shipped. The figures just given show something of how the industry grew and to what it has amounted and to what it has been reduced.

The facts and figures given up to the present have been comparatively easy to secure. However, everyone is naturally interested in what brought about this great reduction in yields. That seems to be a question very easily and readily asked but we are very sorry indeed to have to admit that we are unable to find, from any source, the information which will prove definitely what has brought on this great calamity. It is a calamity because there are thousands of acres going to waste that once produced this pineapple crop. It is estimated that there were about 6,000 acres in pineapples on the East Coast in 1909.

While we cannot prove just what has caused this great loss, we can at least cite several things that have helped to

bring about these conditions.

It is thought by some that after the Hawaiian Islands were acquired by the United States and large canneries were established, the American canners were compelled to refuse the Cuban crop for canning, and it was forced on the open market. The Cuban crop increased from 826,985 crates in 1905 to 1,881,979 in 1911. Since the Cubans were able to produce their crops much cheaper than Florida because they had cheap labor, and used no fertilizers, this had a tendency to force prices down. This cut down the net returns to the Florida growers. They in turn reduced the fertilizer used and gave less care and attention to their fields. In many places where the fields had been bearing continuously for ten to fifteen years, the plants began to show a disease known as Wilt. This seems to have shown up first in the southern district near Miami and worked north and was showing up rather generally all the way up the pineapple territory by 1916. This trouble became so serious that the growers got the State Agricultural Experiment Station to begin work on it about 1914 or 1915. A little later the U. S. D. A. began some investigations and both of these departments are still working on the trouble. However, up to the present they have not arrived at any one definite conclusion as to the cause of the trouble.

Most plants affected with the Wilt showed the presence of nematodes on their roots, therefore nematodes are generally given credit for causing part of the trouble. In fact, I think all the

pathologists that have worked on this pineapple Wilt have agreed in the theory that the trouble is a soil disease. Investigations also indicate that this trouble is of a parasitic nature rather than physiological. However, it has not been definitely established whether the trouble is caused by a fungus or a nematode.

As the troubles in most fields have been admitted to be in the soil, work began as early as 1916 to try to eradicate the trouble from the soil. This has been attempted in a number of ways, such as treating the soil in different ways and by rotation with crops which are highly resistant or immune to the disease, and which will at the same time improve the soil. It is generally admitted by all experts working on the disease that the soil which has continuously grown pineapples is seriously in need of humus.

During 1916 we introduced Natal grass in St. Lucie county on Mr. Hoofnagle's place. This grass grows well on these thin soils and is very strongly resistant to the attacks of nematode. Mr. Hoofnagle is still growing this crop and he has been able to turn under four to five crops in one year. On the land where this Natal Grass has been grown for several years and turned under, the soil is improving in texture, retains its moisture much better and shows very little presence of nematode.

I was in Mr. Hoofnagle's field only a few days ago and he had some tomato plants growing on soil that had been planted to Natal Grass for three years. These plants showed to be practically free from nematode. On the same land

we planted tomato plants in 1916 and it was only a few weeks when the roots of these plants were found to be a perfect mat of knots. I mention this as evidence that the nematode can be controlled by the growing of Natal grass for several seasons, on land which is badly infested with this trouble.

I want to say just a few more words in regard to the present difficulty of growing pineapples in the East Coast region. Fields that have been cleared of their original growth and planted to pineapples have shown the effects of Wilt. Especially is this true after the second year. This disease may show in only a few plants at first, or may show rather generally over the whole field. This condition has caused investigators to think that the disease can be and is, introduced into virgin soil, with the plants or slips.

Possibly after mentioning the many troubles that the pineapple growers are up against it will take an optimist to think there is a great future for the pineapple industry. I am an optimist on this subject, and will try to give a few reasons for my views.

Referring to one of the first reasons for the loss of interest in the pineapple industry on the East Coast, that of competition from cheaply produced pineapples in Cuba, we will not have this to contend with as in the past, because there is no cheap labor in Cuba. Last summer I was on the island and the growers were paying \$2.50 to \$3.50 per day for common day labor. I understand that the same conditions exist today and I imagine will



continue as long as labor is high in this country.

I am confident that the East Coast growers can again produce pineapples with as heavy yields as of old if not more per acre if certain conditions are carried out, for the reasons that:

(1) The old soil is going to be rid of its infection and have more humus added. At present the best method found to bring this condition about is the growing of Natal Grass during several seasons; and the turning of this under as often during the season as the crop matures. As soon as the nematode is exterminated the old field can be planted to pineapples again.

(2) Care will be given to the selection of good, thrifty and healthy slips from healthy plants and fields.

(3) By rotation of crops a pineapple field will not be allowed to remain any longer than while it is showing a good yield. It will be plowed down and seeded to Natal several seasons or if investigators find a better crop, it will be used.

(4) By the use of proper fertilizers which I think will mean, using organic sources of ammonia, potash free from chlorine, and phosphorus in the form of bone meal or slag.

There has been a general impression among growers that foreign slips did better than domestic slips. That is, they were more resistant to Wilt and would give a satisfactory yield for a longer period. On this account we began early last spring to try to find where Red Spanish slips could be bought other than in Florida. We first took the matter up with the Cuban

growers, and while there were plenty of slips on the island we could not get any price quoted. There was a very strong feeling among the commission men there (four of whom practically controlled the export from the island), that if they kept new slips from the Florida growers that they would continue to have a monopoly on the trade in the United States. I will not go into detail here but can say that there is no brotherly love among the pineapple growers in Cuba shown for those in Florida.

We had correspondence with the Bahama Islands and found that their industry was about a thing of the past, and they also were trying to get slips from Cuba.

On our final trip to Cuba we met a friend just from Porto Rico who is connected with one of the Experiment Stations there. He informed me that their industry was about to play out and that they were at their wit's end for plants and were expecting to come to Cuba for slips.

There are plenty of slips in Cuba, or were last season. However, there were millions knocked off rather than to sell them to the Florida growers at \$16.60 per thousand f.o.b. cars at the Cuban growers' station. However, by the assistance of our agent in Havana, who has been over there for years, we were able to get eight cars of slips and suckers. These were planted on different soils and under different conditions. We hope by another season these fields will give a definite idea as to what the Cuban slips will do. All the fields that I have been able to visit



lately, are looking very promising. I understand, however, some of those in Palm Beach county were affected by the cold during this past winter.

This is the first mention I have made of the weather. There are a number of the older growers who contend that there were six or seven seasons, beginning in 1912 or 1913, that the summers were very dry; this caused the pineapple plants to go bad, and that when weather conditions get right again the industry will revive.

We all know that the cold in February and December of 1917 and January of 1918 did serious damage to fields that were in fair condition. Still, I feel that the average weather conditions for a number of years need not be mentioned as a limiting feature to the revival of the pineapple industry on the East Coast.

The growers are interested. This is shown by the fact that they pay \$240.00 per acre for plants. There has been enough investigational work carried on and started to help the growers to gain some idea as to how to start the industry again and keep it going. It appears that there is good money in the growing of the crop. This is going to cause more growers to try and find out more about the troubles which they have had to contend with.

Just last year the growers in St. Lucie county formed a Pineapple Growers Organization and they have raised something over a thousand dollars to carry on this work. Of course it is a great pity that this work could not be

carried on by our State Experiment Station. However, gentlemen, every one of us must use our influence to see that they get more money at Gainesville. Then we can ask for more assistance.

In conclusion I want to say that I feel that the pineapple industry can and will be revived into a great commercial business. To accomplish this the growers need to remember these four things:

(1) Rid the old soil of its infection (whatever it may be), and add humus to the soil.

(2) Select good, healthy slips from healthy, thrifty, heavy yielding fields.

(3) Rotate the crops. Do not let one field continue to bear longer than it will give a paying crop.

(4) Use the proper kind of fertilizer.

Please let me add that if anyone wants to go to Cuba to get slips, take my advice and at least learn enough Spanish to be able to cuss efficiently and fluently in such a way that it will be intelligently understood by the average Cuban.

Mr. O. W. Sadler: I would like to ask Mr. McLendon as to the comparative merits of the Red Spanish and Smooth Cayenne varieties.

Mr. McLendon: I am afraid I am not informed on varieties. I would like to ask Prof. Rolfs to answer the question.

Mr. Rolfs: For a family garden, I should want to have both varieties, the Red Spanish and the Smooth Cayenne. For commercial purposes, much would depend on where you were located. If

you want to grow pineapples extensively on a ten, twenty or forty-acre scale on the East Coast, use the Red Spanish; if you want to grow not to exceed ten acres, the Smooth Cayenne would be very good. It would make a nice thing. The Smooth Cayenne is a little more difficult to raise; it

takes longer to come into bearing. It is a very good thing to grow. It will bring a good profit to you, however, you have to use a private market more largely than the open sales market, but at the same time there is practically an unlimited sale for the Smooth Cayenne.

# The Eustis Limequat. A New Hardy Lime

T. Ralph Robinson, United States Department of Agriculture,  
Washington, D. C.

The coming of prohibition has affected many lines of industry in various and often unexpected ways. It is now claimed that the demand for limes and lemons has been seriously affected by the abolition of gin-ricky and similar concoctions, so that it may seem a waste of time to introduce to you a new fruit of the lime character.

There will doubtless, however, come a reaction and the lime may soon become even more in demand for its own excellent qualities and not merely as an added flavor.

Moreover, for Florida and the Gulf Coast the supply of acid fruits of the lime or lemon character is decidedly deficient for several reasons. In the first place, they are too easily injured by cold to be grown with success except in a few well protected spots. The importation into Florida of the California lemons is cut off owing to the danger of introducing the "brown rot." Mediterranean lemons, when imported, are expensive; can only be obtained in the larger towns, and there is no knowing when some new disease may make it undesirable to admit Mediterranean citrus fruits into our citrus-growing sections. And so it often happens that a lemonade or limeade, or the fruit itself for flavoring, is harder

to obtain in the region where citrus culture is a leading industry than in the North, where no citrus fruits are produced.

Regardless, therefore, of the gin-ricky and the shipping value of the limes, a lime that could be safely grown for local use would fill a long felt want in the citrus growing regions of the Gulf states.

In January, 1913, Mr. Walter T. Swingle, of the U. S. Department of Agriculture, read a paper before the American Breeders' Association at Columbia, S. C., in which he made reference to the limequat, as follows:

"Another new type of fruit is the limequat, which I originated in 1909 by crossing the common West Indian lime with the kumquat orange. I do not need to explain to those familiar with citrus fruits that the lime is the most tender of all the commonly grown plants of this group. It is frequently frozen to the ground even in southern Florida, and is often injured by frosts which have scarcely any effect on other citrus trees. The kumquat, on the other hand, is one of the hardiest of the evergreen citrus fruit trees. This is, without doubt, due not so much to its direct powers of cold resistance as to its remarkable dormancy. The kum-



quat is able to pass unaffected through long spells of hot weather, which force other citrus trees into a tender and succulent growth that is liable to be injured by even a slight frost. Some measure of its dormancy is indicated by the fact that it flowers from two to three months later than other citrus trees. Fortunately the pulp of the kumquat, although small in amount, is mildly acid and, as might be expected, the hybrids between the lime and the kumquat prove to be of a very desirable character. The limequats vary in size from that of a large kumquat to that of a small lime. The skin is thin and of agreeable aroma and flavor, and the pulp juicy and of varying degrees of acidity, some of the hybrids being almost as acid as the sourest lime, others being scarcely more acid than the kumquat itself."

This series of lime-kumquat crosses, made June 2, 1909, at Eustis, Florida, resulted as here stated in a lot of sister hybrids varying in character, all more or less desirable.

The last cold spell that proved damaging to citrus in Florida, that of February, 1917, brought to me a realization that there existed in Florida a real need for a hardy lime or similar acid fruit.

When I returned to Washington in 1918 to re-enter the service of the Department of Agriculture, I found fruiting in one of the Department of Agriculture greenhouses one of these hybrids, known simply as Hybrid No. 48798. In this particular cross, pollen of the round kumquat (*Fortunella Ja-*

*ponica*) was used in pollenizing the common or West Indian lime.

The fruit immediately attracted my attention. It was striking in appearance, resembling the oval kumquat, though smoother in texture, and less elongated in shape. The color, when mature, is a light yellow, resembling that of grapefruit. When cut the fruit shows its lime character; it is thin-skinned, has few seeds, is very juicy, and the flavor can hardly be distinguished even by an expert from the true lime. The rind, moreover, is distinctly edible, like that of the kumquat, so that for use in preserving it would have some advantages over the true lime.

Specimens submitted to the citrus experts and growers have in every case brought forth most enthusiastic opinions, it being held that the limequat's place in citrus culture is not dependent entirely on unusual hardiness. Even if it should prove no more hardy than the sweet orange, it would be of great value throughout the orange-growing regions, as the lime is so extremely tender that its culture is now almost entirely confined to the protected keys along the Florida coast. Sister hybrids of this limequat have been fruited out at Glen St. Mary, Florida, in the northern tier of Florida counties, but were killed out in the successive freezes of 1917 and 1918. With a little protection while young and during unusually severe weather, it is probable that this hardy form of lime could be grown at least in home gardens all around the Gulf Coast.

The plant in the Department greenhouse was a pot-grown plant budded on grapefruit stock that was transplanted in February, 1917, to the bed in the large orange house. It was then only two feet in height. It bloomed and set fruit the next spring, maturing a good crop of fruit that fall and winter. It promises to be more or less everbearing, having bloom and fruit at the same time, like the lime parent.

The spines on the bearing wood and young growth are usually quite inconspicuous, a decided point in favor of this hybrid. Some of the sister hybrids exhibit rather large spines, even on the young wood.

The foliage characters indicate that this limequat will possess much of the immunity to disease and insect pests enjoyed by the kumquat. As is well known, the kumquat is remarkably free from Scab and Anthracnose, which often seriously disfigure the common lime. The kumquat is also the most resistant of all citrus varieties to Citrus Canker, amounting to practical immunity. Inoculation experiments have already demonstrated that the limequat is very resistant to this disease.

It is desirable to learn, as soon as possible, the productiveness of the lime-

quat on stocks best suited to orange growing soils. Its fruiting season is also of importance, but the indications are that it will produce some fruit during a good part of the year. This can doubtless be influenced to some extent by methods of fertilization and cultivation.

Budding on different stocks has already been done in several typical citrus localities in Florida, and it has also been introduced for trial in the other Gulf states and in California. Thus far it has done well on all stocks tried. It promises to afford a valuable addition to our citrus fruits, especially for home gardens and local markets. Up to the present time, it has been known simply as the limequat No. 48798. As other limequats may later be propagated, it would be desirable to have a distinctive name for this fruit. As the cross was made at Eustis, a well known citrus center, it is here proposed, with the approval of the originator, Walter T. Swingle, to name this fruit, the "Eustis limequat." A technical description will shortly be issued as a Department of Agriculture circular to place this fruit on the list of established horticultural varieties.



## Pecan Culture in Florida

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C. A. Reed, Nut Culturist, U. S. Department of Agriculture, Washington, D. C.

Florida has a set of conditions peculiar to itself as regards its part in the pecan industry. Large, stately trees and scattered orchards in North Florida planted prior to 1900 give rank to the State as one of the pioneers in the cultivation of this nut. The profit which has been derived from many of the older trees and orchards affords ample proof that there is good money in pecan growing in Florida. The main question is not whether pecans can be grown with greater profit in some other state than they can here, but whether there is as much or more profit in growing pecans here as there might be in other crops if grown on the same ground. Another question is how to raise as good or better pecans in Florida as are raised in any other state, for unless this is done, Florida will not only be kept out of the northern markets, but her own markets will be supplied with pecans from other states.

That Florida marks the southern limit of pecan growing in the eastern states is obvious; but whether that limit ends at Key West or some distance farther north has not yet been fully determined. We well know that the pecan species does not readily adapt itself to peat soils, nor to drifting sands, nor to poorly drained swamp lands. We know that for its best development it requires a fertile clay or sandy loam, moist, yet at the same time

well drained. We know also that winter injury or sun scald, as it is also called, is very apt to be a serious menace in sandy soils unless underlaid with firm clay subsoils. With these facts as a basis, we know that conditions are much more favorable for pecan growing in that part of the State lying north of an imaginary line extending from New Smyrna on the east across to Tampa, than they are south of that line. Also that in general, conditions become increasingly more favorable as we go north of that line and, conversely, less so as we go south of it. It is, therefore, in middle northern, northern and in western Florida that we would naturally expect to find, and do find, the pecan industry the most highly developed.

There are very few pecan trees in southern Florida, although here and there stray trees are doing well, below the line we have arbitrarily established. Unconfirmed but reliably regarded reports have it that there are fine specimen trees in Miami and Ft. Myers. Some years ago the writer visited a hundred or more thrifty young pecan trees near Lake Huntley, thirty-five miles east of Arcadia, and about as far north of Lake Okeechobee, on the very backbone of the State. As well as could then be judged the local conditions were by no means unfavorable to successful pecan growing. Many of the trees had been budded or grafted on stocks



of a dwarf-growing species of hickory indigenous to that locality. Just how these trees are bearing or what their average performance has been, the writer can not say. He has no later information.

Florida is much like other pecan states in that the yield from her better varieties is almost in direct proportion to the fertility of the soil. Few of the soils in the State are closely similar to those of the more western sections in which, and *only* in which, the pecan species is indigenous. There is no large area of alluvial soil anywhere in Florida. Nature never grew any great number of pecan trees far outside of the overflow river-bottom lands, except possibly in Mexico and there is serious doubt as to whether there are native pecans in Mexico or, for that matter, anywhere else in the world outside of the United States. At any rate, there are so few successful pecan areas outside of this country that it is useless to look beyond our own borders for information throwing further light on pecan growing.

Here in Florida as in other sections, the best results are invariably from trees about the farm or city buildings. Chickens, hogs, mules, or any other kind of live stock running under the trees, unless they injure some part of the trees, enable them to pay big dividends. It is the doorway or barnyard trees that make the most rapid growth, have the richest color, the densest foliage, the fewest dead branches, and bear the most regular and liberal crops.

Judging from the way pecan trees, recently visited have performed in the past, and from the way they give promise to perform in the future, even though sometimes growing in pure deep sand, there

is no reason why practically every home in middle and northern Florida should not have its own pecan trees, to salvage much of the plant food now going to waste from the chicken parks, and barn lots. There are unknown possibilities in by-product pecan crops if managed in this way. Many aged couples in southern cities are today living comfortably because the taxes, insurance, and upkeep are being paid, with perhaps a margin in addition, by pecan trees, which these couples planted 15 or 25 years ago while their neighbors planted oaks.

To get the most out of the pecan orchards already planted, Florida must add to the fertility of the soil. Cowpeas, beggar-weed, Lespedeza, velvet beans, or other leguminous crops must be grown and turned under year after year. There is little danger of over-enrichment of the soil, although that is possible. If it should happen, it could be quickly remedied by simply withholding the cover crop for a year or two.

In not a few of Florida's orchards, like most of the earlier ones planted in other states as well, the trees are too closely planted. The trees now have a great amount of dead wood and long spindling branches, void of laterals except near the ends. In case of non-bearing orchards, the alternate trees should be cut out and those remaining, headed back to stimulate new growth and re-shape the trees. In less run-down orchards the alternate trees should be dehorned severely so as to promote this new wood. For a year, or possibly two years, the remaining trees can be allowed to go without being disturbed. The increased light and space temporarily allowed them will

permit increased crops for the time being. As soon as the trees which were dehorned begin to take shape again, those originally left untouched should be done away with. In good soil, sixty feet apart each way is now regarded as being about the most suitable orchard distance. That distance certainly is not too great. More space may yet prove to be better.

In planting, budded trees, or trees grafted at least a foot and a half above ground are preferable to those budded lower, or to root grafted trees. Trees propagated near or below the surface of the ground are much more subject to winter injury, or sun scald, as we are calling it, than are those worked well above ground. This is because low working does away with, for upwards of ten years, the natural scaly bark of the seedling about the trunk intended by nature as a means of winter protection.

We are all familiar with the smoothness of the bark above a bud or graft as contrasted with that below. When this smooth bark, which is full of life to very near its outer surface, is brought to the ground level, the warmth of the sun in winter, reflected from the earth's surface, usually on the southwest side of the trunk, causes the wood cells to swell up and to make ready for growth. A freeze during the following night catches the sap, injures the cell structure, and the harm has been done. This is followed by what is known as "sour sap," and some kind of action not clearly understood but which is known to be decidedly destructive to the affected area.

Occasionally the injured tree recovers of itself before serious damage has been

done. Sometimes relief is afforded by merely slitting the bark through the injured area and allowing the fermenting sap to escape. Not infrequently, the injury is unnoticed until the area so affected has enlarged and completely girdled the tree, causing death suddenly. With the exception of starved or devitalized trees, which are in a condition to succumb upon any slight pretext, it is the most vigorous and rapid-growing trees that are affected.

The remedy is, as has already been partly stated, to avoid low propagated trees, and quick growing sandy soils, especially unless underlaid by firm but not hardpan clay subsoils, and to wrap the trunks of the trees each winter until five or six years old with burlap, heavy paper, rabbit veneer, or other material which will shade the trunks and protect them from the warmth of the sun during periods of freezing nights. As a precaution, it is well to avoid such cultivation and fertilization as tends to stimulate late growth in fall. Cultivation should be stopped by August at the latest.

In regard to varieties, we must be guided by two factors. (1) We must plant what will succeed in our locality. (2) We must grow what the trade wants and not what we may happen to fancy ourselves. So far as possible, we must also grow what our neighbors are growing, so that altogether we can have quantity great enough to invite the wholesale trade. The trade can not and will not assimilate a great number of varieties or grades. Within certain limits quantity and uniformity are of greater importance in the marketing of pecans than is quality. Quality must be good but not nec-



essarily fancy. In quantity, the trade wants the things it knows about, and not the "just as good" kind.

From four to six varieties, when of well-selected sorts, is proving to be a very satisfactory and workable number for both the orchardist and the tradesman to handle. Intelligent selection with that number affords a prolonging of the blossoming and pollination period in spring, thereby enhancing the chances of avoiding bad weather, and it also makes possible the maximum length of the harvesting period. The cream of the pecan market for the whole year is that of Thanksgiving. We must have some varieties for that market. With large crops to harvest, it is of advantage to have a harvesting period capable of possible extension from October 10th to December 1st. With some varietal combinations in favorable years, it is possible to begin harvest by from September 15th to 25th, and under stress of labor shortage, inclement weather or similar condition, it sometimes happens that the crop can not all be gathered until late in December. In southwestern Georgia, the crop of 1918 was not all garnered until the first days of January. In dry West Texas, nuts from the wild crop of 1919 were still being harvested during the first part of March, 1920.

Taking together all the points in regard to varieties that have thus far seemed of leading importance, from the standpoints of both the producer and the tradesman, the Schley, Alley, Pabst and Stuart may well be regarded as being the big four of the major portion of the pecan territory. In this part of Florida, these sorts do not seem to give as satisfactory returns as do

some others. They do well here in the Florida climate only in the richest soils. With maximum conditions of soil and moisture, some of these have in a number of known instances performed very satisfactorily, notably on the north bank of Lake Santa Fe near Waldo, and in St. Augustine. Nuts from the former locality have several times won first premiums at meetings of the National Nut Growers Association.

On the whole, results to date indicate that the Bradley, Curtis, James, Moore and President, though not necessarily in that order are among the surest of the good varieties for Florida use. Other good ones of which you may know and be inclined to plant are Delmas, Frottscher, Hume, Kennedy, Moneymaker, Randall, Success, and Van Deman. Each of these has been omitted for a definite reason. The Delmas and Van Deman are seriously subject to pecan scab; the latter is in addition a shy bearer unless given special nourishment. The Frottscher is a shy and undependable bearer. It is being abandoned in the older orchards where it is best known. The Hume, Kennedy and Randall are all good varieties, and by some rated as being among the best for middle Florida. All are sister seedlings to Curtis and unless superior to it in some ways, there is no good reason why they should be used in preference to it. They are, however, too good to cut out from orchards already planted, but for uniformity's sake, until we know definitely that these sorts are superior to Curtis, let us stick to that variety in future planting.

The Moneymaker is very desirable in some ways. It is an excellent bearer,



bearing at an early age and bearing regularly. It matures early in the season, but the best Moneymakers you ever saw were but ordinary nuts. They are variable in size, without attractiveness in appearance, thick-shelled, and much of the time poorly filled. In the market it compares poorly with Schley, Alley, Pabst or Stuart. Nevertheless, the Money-maker will withstand neglect, and perhaps, if abuse and neglect are necessary it is one of the surest of all varieties to give fair returns.

When perfect, the Success is one of the best varieties grown. It is large, attractive in appearance, thin-shelled, easy to crack, and when at their best the kernels are plump, of a rich brown color, and exceedingly pleasing of flavor and quality. There are two drawbacks to the Success; it tends to over-bear, and as a result to develop poorly-filled and even shrivelled kernels. The greater drawback, however, so far as Florida is concerned, is that, according to very recent reports, it is susceptible to pecan scab in this state. Mr. McManus of Waldo finds that it scabs "almost as bad as Delmas."

Time forbids a detailed discussion of all varieties. However, there are four well known sorts which merit mention for reason of their undesirability. These are Mobile, Nelson, Rome (syn. Columbia), and Teche. The first two and the last are extremely prolific; the first fairly thin-shelled, but after the first few crops most disappointing inside the shell. The Nelson is one of the largest of all varieties. It is also one of the thickest shelled, but it is like the Mobile in its excessively high proportion of faulty ker-

nels and nuts, the shells of which are wholly blank. The Teche is over-productive, small, of poor flavor, and often so poorly filled that they are not picked up from the ground.

The Rome, or Columbia, as it is synonymously called, is one grand failure from first to last, with few unimportant exceptions.

In conclusion, let me summarize briefly a few of the points touched upon in the foregoing and which are left here for your consideration.

Carefully select your varieties from those already known to the trade; do not have more than six at the outside, better not more than four. Buy from reliable nurserymen, not from agents, unless you know them to the core. Plant in your richest soil, preferably 60x60 feet each way. Use only budded trees or those which have been grafted a foot or more above ground. If troubled with winter injury, shade the trunks during spells of night freezes, while the trees are under six years of age. Grow Schley, Alley, Pabst and Stuart when you can overcome climatic conditions. Add the Moore to this group as a variety you can harvest in some years before September 25th. For general planting, for the present stick to Bradley, Curtis, James, Moore and President. With the exception of the James these are all Florida varieties.

Mr. Simmons: I would like to ask what influence the type of soil has in controlling the distance between trees.

Mr. Reed: To the extent at least, that in a rich soil the trees are apt to crowd each other sooner than in a thin soil, and yet on the other hand, in a thin soil the

roots are apt to grow farther from the top, so it may be an advantage there to give them the same space. On the whole I think that 60x60 is as good a distance as we can give them.

Mr. Simmons: You would recommend that for all types of soil?

Mr. Reed: I think so. Now, there may be two sides to that, mine and also President Hume's. It is quite an important question.

Mr. Simmons: My orchard is planted on a very thin type of soil, what we know as good for nothing except to hold the world together; and my trees have developed in size apparently, as other trees have in other types of soil. I have had a great many nut growers to visit my orchard, and last fall a year ago, they noticed the improvement and I was very much encouraged by their statements that they had never seen trees of that size and age that had a more abundant crop, and one grower said that he felt that I had 35 or 40 per cent more fruit on my trees for the same age and size than he had ever seen on a forty-acre plot. My question was whether or not we should determine the distance between the tree rows by the type of soil.

Mr. Hume: I might say that my usual recommendations are 40 to 45 feet apart. I am very certain that during the first 25 years you will get more fruit.

Mr. Reed: You are talking, Mr. President, about these thin soils?

Mr. Hume: I am referring to our soils generally.

Mr. Reed: It may be interesting in this connection to cite the case of a little orchard in Thomasville, set 50 feet each way in 1905. This spring the alternate

trees have been removed, leaving 100 feet apart. There is a man who had the nerve to remove alternate trees.

Mr. ———: That is good practice.

Mr. Hume: I think if I were planting, I would plant about 35 feet apart and then 30 years from now I would do about the same as this Georgia man has done. I would remove the alternate trees, but they say very few men have the nerve to do that.

Mr. ———: Mr. President, it may be of interest for me to state that last year I saw some very good pecan trees that were beginning to bear, down about the tip of Florida, at Homestead, the place where they don't have any soil; it is all rock, but I think it is broken up where the trees were planted. That same man is also succeeding very well with the Japanese persimmon and peach, but I was surprised to find the pecans looking so well and growing.

Mr. Taber: I would like to say, Mr. President, that I was a little bit surprised at the Frotscher; now I may be a little bit sensitive because I introduced this variety into the State, but apart from that I think, Mr. President, that you will bear me out that our older pecans of the Frotscher variety have netted us more money this year than any of the varieties we have.

Mr. Hume: I think that is true. I do not believe Mr. Reed's criticism of Success either. I have had Success and Delmas standing side by side. I have cut off and worked all the Delmas over because of scab, and I have never seen scab on Success. Why Mr. McManus should have it within 40 or 50 miles of me and we not have it is a question in my mind



and when I am asked for a recommendation for planting in either northern or western Florida I put Success in the first place. I am interested in a grove containing about forty acres that is just coming into bearing. This past fall we got our first crop of any size out of it. It is, I think, seven years old. The crop was not very large, about seven hundred pounds. The grove is composed approximately of equal parts of Success, Stewart and Curtis. We got as much Success out of it as we did Curtis. The Curtis sold for forty cents and the Success sixty cents wholesale. I rather like Success.

Mr. Taber: The Frotscher brought seventy-five cents.

Mr. Reed: We argued this Success pretty thoroughly at the meeting of the Gulf Coast Horticultural Society held in Mobile last week, of which Dr. Winberg is President. The Success is regarded as one of their best and there is no denying that on young trees the Success does perform well and satisfactorily. And when the nuts are well filled, as usual on young trees, there are no better nuts. I would be inclined to agree with Prof. Hume or any other, who puts Success in the No. 1 group, but so many times we have seen Success nuts a little old, and while the Success continues to fruit, they are partially and imperfectly filled.

Mr. Hume: Isn't that a matter of underfeeding? Is it not the fault of the grower rather than the variety?

Mr. Reed: We cannot say. In the orchards of some of the most experienced pecan growers I have seen Success on the ground so scarce that they were not even picked up, but on the same tree in a little more favorable year, the nuts would be

all that could be desired. It is not the high performance occasionally we are interested in; it is the high average performance, and if the Success could maintain that high performance that it reached frequently, with young trees and in certain years, when the trees get older, we would not mind Success at all.

Mr. Hume: Well, it is true, Mr. Reed, that Success is not an old variety, but is planted over the country generally.

Mr. Reed: As regards to the Frotscher, it has, perhaps, been favored more in southwest Georgia than anywhere else and many of the Frotscher trees have been top worked.

Mr. Hume: What is Mr. H. C. White doing with it?

Mr. Reed: Mr. White has top worked many of his trees. He has one tree in his garden that is doing exceptionally well. It has been regarded as a parent tree.

Mr. Hume: Let us consider what Mr. Simmons has been doing.

Mr.——: He has been making garden under his trees.

Mr. Reed: Well, if anyone cares to do it it is up to him.

Mr. Simmons: Mr. Chairman, Mr. Reed criticised me two days ago on going through my grove. He said that I was depleting my grove by not growing field crops and turning the humus into the soil. I want to say, therefore, that I am very thoroughly impressed by what Mr. Reed said in regard to varieties and location. I think we are passing the time in the pecan industry when we should undertake to experiment. When a man wants to plant a few trees, I think he can do so in absolute safety by studying the performance



of the varieties and the type of soil in which he wants to plant.

If a man comes to me and wants to buy trees. I only recommend four varieties. If he says he must have a big nut, I recommend putting in the James, Mon-eymaker, President, and for my fourth choice variety, I have three of four others that I would suggest; but I would say in defence of the Teche, that while we have never found the Teche falling short of its wearing qualities for our soil, the Teche has been a wonderful producing nut, and the only objection I can have is the late maturing. They are the latest maturing nut and often times we have to be late to get our crops to market. But with this exception I think the Teche is a splendid nut. We all plant nut trees for the purpose of making money, and it certainly is a wonderful nut.

Mr. ———: People buy usually for looks and size, and the great majority of the people are not as familiar with the flavor and quality of the nut as they should be and therefore the Teche has been a wonderfully well paying variety with us.

Mr. ———: The Teche does bear, no question about that, but the Teche has an awfully hard reputation all over the country and we in Florida must realize that we have got to grow a product which will compete with the products shipped in from Georgia, Alabama and Mississippi.

Mr. Reed: I think I can promise you

that Georgia and the other states where they have more pecan acreage, perhaps, than this whole country together, are growing Schley, Alley and Stuart and they are going to put them on the market. I would think a second or third time, and I would sit up at night and think about it a little before I would plant Teche to compete with the Georgia market.

Mr. Hume: We would think a good deal before we would put the Schley in down here. Nobody will ever plant Schley down here; they go slow on Schley here in the State. This is a broad question, Mr. Reed, and we cannot say it all in five minutes.

Mr. Simmons: I am not recommending anyone to plant Teche, and I would not recommend anyone to plant Frot-scher; that has been one of the poorest nuts on my property.

Mr. Taber: I am going to have the last word and the next word. I introduced the Frotscher into this State, and I only want to say this, that I think the pecan is in the same status today, that the orange was in twenty years ago. As to the adaptation and selection of varieties, we can easily get misinformation if we talk about any one variety as sized up entirely by one location. Now I will admit that at our place in Glen Saint Mary, we have had good Frotscher trees, bearing as well, and the main point, bringing more money than anything else on the place.

# Observations of Pecans and Deciduous Fruits In North and West Florida

H. G. Clayton, University of Florida, Gainesville.

South Florida is to many the only section of Florida thought of when fruit growing in this State is mentioned. It is truly the section where non-deciduous fruit growing is safest and most profitable and holds a place all its own. On the other hand too many people, both our own and our visitors forget the great part of our State that is naturally adapted to the growing of deciduous fruits. This lack of interest may be attributed largely to the advertising matter circulated from South Florida and the lack of it from North and West Florida. Our neighbors, however, across the Georgia and Alabama line are now taking advantage of the good soil offered at low prices and this part of the State, too, is being brought up and hitched to the wagon of production.

Peaches, pears, pecans, Satsuma oranges and figs are the items which I wish to deal with briefly at this time as I have observed them.

It seems that one fact which we have all observed should at least be mentioned here. In the development of any new system of farming or a similar industry, there are always a few men who will pioneer and devote time, energy and money toward such development, but the great

mass hold back until conditions force them to change or a good year or two with high prices offer inducements hard to turn down. For example, take the citrus industry, a couple of good years and everybody wants a grove, while a couple of bad years discourages a lot of people from investing in or aiding in developing this industry.

The same is true of our deciduous fruits and pecans. Under King Cotton the small farmer didn't have money to set out more than a few trees for home use. While now under a different farming system it has been found that things other than cotton can be grown and this, coupled with high prices received for all of this type fruit and for pecans raised last year, will have and is having more effect than years of talking could accomplish.

Some good work is being done in nearly all of the counties along this line and I will mention here just two or three things that might be of interest. In Santa Rosa county, the county agent has started a pecan club among his boys and girls. They plant the nuts which he furnishes, in barrels and later they will be taught how to bud these and transplant the trees to the field.



In Taylor county some similar work is being done with fruit trees adapted to that section.

In Walton county a Fruit Growers' Club has been formed for the purpose of getting more fruit trees planted.

Down in Liberty county a beginning in spraying is being made and this will encourage the home growing of fruits.

### Peaches.

The peach trees which I have seen this year look good and prospects are promising for a good crop. There is plenty of moisture in the ground and the trees are full of young fruit about the size of peaches.

The largest plantings are in Escambia and Jackson counties and the favorite varieties are Belle of Georgia and Greensboro. One trouble experienced last season in Escambia county was in the marketing; the peaches were allowed to get too ripe before shipping. This will, however, be overcome this year.

I regret that no acreage figures are available at this time for the State; however, in Escambia county there are 700 to 800 acres and in Jackson county there are probably 200 acres at least.

An increasing number of Georgia and Alabama farmers are now coming into Florida and these men are familiar with the growing of peaches and through them and what has already been accomplished, Florida has a good chance of becoming a peach-producing State.

The soil in West Florida is just as well adapted to the growing of peaches as any in Georgia and the season is such that we

can beat them to market from a week to ten days.

### Pears.

The pear crop has been allowed to go backward and the State does not produce as many pears now as several years ago. Pear blight and failure to control this disease is largely responsible for the decline of the industry. A blight-proof variety has, however, been put on the market and plantings of these look very promising. With this variety to work with it is thought that the production of pears will gradually come back.

### Figs.

Several quite extensive plantings of figs have been made in Escambia, Walton and Bay counties. It is, however, too early to predict the outcome. My observation from trees in various sections is that root knot appears less troublesome on the clay soils than in some of the lighter soils.

### Satsuma Oranges.

The satsumas did very well last season and a good price was received for all the fruit produced.

This industry received a hard blow several years ago when citrus canker was found in Florida, for this enemy was located in some of the satsuma plantings and the destruction of these trees discouraged new plantings. At this time, however, it is almost impossible to buy trees as the nurserymen are sold out.

The trees set a heavy bloom this spring and are in good, thrifty condition, so prospects look good for this season.



It might be well to mention here that the local markets have so far taken the crop at good prices. The production is not large enough for shipments of any size to go out yet.

The future satsuma planting, it seems to me, will be largely a few acres on the farms of a large number of farmers, and from this standpoint looks like a good proposition.

They do best on a clay soil and trifoliate stock is the only satisfactory stock to bud upon.

On the trees I have observed this spring, whitefly seems to be doing more damage than any other pest.

### Pecans.

The best estimates available show that the State of Florida today has 114,000 bearing pecan trees, or, expressed another way, 10,363 acres. We have no figures available at this time on either the acreage or number of young trees planted in the State. The interest for the past few years is, however, greater than at any time in the history of this industry and the planting at this time is being held back by the inability of nurseries to supply the nursery trees. A comparison may, perhaps, be possible as to the growth of the industry by a consideration of the following figures:

In 1910 there were 42,512 bearing trees in the State and the yield was given at  $7\frac{1}{4}$  pounds per tree or a production of 307,600 pounds in round numbers. In 1919 the production was 14 pounds per tree and 1,600,000 for the State. In 1918, 58 per cent of the bearing trees were grafted, budded or top worked and

49 per cent of the crop was of the improved, or better variety of nuts. In 1919-20, 60 per cent of the bearing trees were grafted, budded or top worked. An increase of 11 per cent, and 52 per cent of the crop was of improved varieties, this an increase of 3 per cent.

This last season South Georgia marketed \$400,000 worth of pecans and Florida's crop of 1,600,000 pounds has a value of at least this much.

During the last season the Nut Growers' Association of Florida, Georgia and Alabama, marketed quite a few pecans from Florida and I have reliable information to the effect that ten cents above the common price (received by growers not in the Association) was realized by growers who shipped through this Association.

Some people might be interested in knowing what in Florida is considered a good average yield from a pecan grove, and good conservative men of years' experience place this at 500 pounds per acre year in and year out.

Prospects this spring are for a good crop of nuts so far as is able to be foretold at this time. The heavy rains of the winter and spring have enabled the trees to put out a fine growth. The high prices received for last season's crop caused fertilizer to be applied with a freer hand and this has helped. The present prospects look very good to the growers. Some groves in South Georgia have sold for as high as \$1,000 an acre during the past few months and some good prices have been refused for bearing groves in Florida.

The entomologist for the government, who has been working on pecan insects for the past few years in Florida has completed this work and leaves this week for Texas. Work upon the diseases is, however, still being carried on in South Georgia.

Taking a view of the pecan situation as a whole, it can be conservatively said that the outlook for Florida during the next few years is good.

Stock raising and pecan growing fit together nicely and this combination is one likely to appeal to numbers of people.

# Honey Bees and Orange Trees

Frank Stirling, State Plant Board, Gainesville.

Honey bees and fruit growing go well together. Florida citrus growers all over the State are beginning to realize more and more the wonderful help that bees render as a source of revenue whether oranges or grapefruit are grown. Of course, there are many other plants, such as the partridge pea, palmetto, gall-berry, etc., which grow in the citrus regions and help in the annual honey harvest, but one of the real, big supplies of nectar gathered by the bees comes from citrus blossoms.

A combination of bee keeping and orange growing works in very nicely from the standpoint that the bees do not require any care or attention at the time the grower is busy with harvesting his fruit crop; neither does the grove require much attention when the grower is busy with his bees, as the swarming period as well as the harvesting of the honey crop comes at a time in the spring and summer when the grove is not calling for a large amount of work.

Again, honey bees are responsible for increased production of certain fruits, for it appears that certain crops, such as cucumbers and melons, cannot be secured at their best without the help of the bee as a pollenizing agent, and for this reason they are sometimes called the "marriage priests" of the flowers. However, do not be mistaken in believing that better or

larger crops of oranges and grapefruit can be secured by this pollenization, for it has been pretty well established that orange blossoms are self-pollinated and do not require the aid of any insect for this purpose.

Florida citrus growers have, until recently, been backward in the bee-keeping industry. There have been, however, some few pioneer bee keepers in this State who have made more than a success of it.

The late Mr. O. O. Poppleton was considered one of the foremost veteran bee keepers in the State, and on the East Coast where he operated he harvested immense crops of honey from the orange, as well as from palmetto and wild mangrove. Mr. W. S. Hart, venerable treasurer of this Society and one of its charter members, for years operated an apiary with profitable results in his groves along the East Coast. Mr. H. L. Christopher is now operating several apiaries in the groves of the Atwood grapefruit grove at Manatee. While the main harvests of honey here in Florida were formerly produced in the western portions of Florida, in the bottom lands of the Apalachicola and Choclahatchee Rivers, the opportunities for this industry in the citrus groves of the peninsular part of the State are without doubt fully as great.



Bee-keeping possibilities in Florida are greater than in many other states for here the weather is not severe. Bees can be wintered out of doors in single-walled hives with splendid results and the orange blossoms which appear first of all in the spring are a wonderful stimulant for brood-rearing. Given a reasonably good location in the orange section, with modern beehives, and colonies of Italian bees of proper strength and number, the orange grower as a bee keeper stands upon better footing than many other bee keepers elsewhere. Of course the results he will achieve will depend upon his management. If he will study his bees, learn their ways, and acquire a comprehensive understanding of their traits, they will compensate him for his time and efforts in a most generous way, and will, at the same time, afford him abundant opportunity to gain a first-hand knowledge of one of the most interesting revelations nature has to disclose to mankind.

In many groves throughout our State, a few hives of bees are kept very much as the farmer and small townsman invariably keeps a few chickens. At some time or other a hive or two of these industrious insects have been bought or a stray swarm captured, a place has been assigned to them in any old out-of-the-way corner of the grove, and there with almost no attention from the owner, they have been permitted to dwell in peace. Occasionally the hive has been opened and a small or a large supply of honey has been removed with not even a passing thought given to the source from which this wonderful product comes or to the possibilities of increased production through systematic attention and the application of advanced

bee-keeping methods. Some of these neglected hives are in the very choicest citrus-growing sections, in communities rich with orange blossoms, etc., and, even though only a few colonies of bees are kept, they could, with proper management be made to yield a honey crop not only sufficient to meet the demands of the owner and his family but to supply many a neighbor's table as well. In fact, these colonies could contribute some small share towards supplying the demand for a product that all the world wants but never gets anywhere near enough of.

Bee keeping in the groves of our State should be today far more important than it is. When grandfather, or even father, was a boy, a dozen or so "swarms" were kept in "gums," old logs or the old-fashioned straw hives, in a corner of the grove as far away from the house and live stock as possible. These methods should now be "out of date." Bees should be kept in a manner in keeping with other lines of progress.

The only profitable way to keep bees is in hives with movable frames. The bees build their combs in these frames, which can then be manipulated by the bee keeper as necessary. The keeping of bees in boxes, hollow logs, etc., is not profitable, is often a menace to progressive bee keepers, and should be strongly condemned. Bees in box hives (plain boxes with no frames and with combs built at the will of the bees) are too often seen in all parts of the State. The owners may obtain from them a few pounds of inferior honey a year and carelessly continue in the antiquated practice. In some cases this type of bee keeping does little harm to others but in sections where dis-

eases of the honey bee occur the box hive is a serious nuisance and should be abolished. A most important consideration in purchasing bees is to see that they are free from disease. In our State the Plant Board has inspectors of apiaries who can be consulted on this point. The inspectors spend considerable time in visiting apiaries for the purpose of learning if disease is present, but if it is not possible for an inspector to be found at once, then one should refuse to accept bees that have any dead brood.

It might be of interest to know something of the honey-bee family, whose members we hear buzzing in our groves in the spring. In every beehive there are found three individual types of bees: the workers, the drones, and the queen. The worker bees are females who perform all of the essential duties of the colony, such as gathering food, nursing, etc., with the exception of laying eggs. This last duty belongs to the queen herself, who is a fully developed female, the bee-mother of the colony. The drones are male bees who contribute nothing to the upkeep of the colony and whose only value is that of mating with the queen at proper seasons. Drones are tolerated in the colony only during a honey flow and mating season.

It might also be of interest to know something about what honey-bees eat and where they find their food. They will gather nectar and pollen from almost any flower or blossom that grows. The task of providing stores for the entire colony as well as any other duties in and out of the hive, falls upon the worker bees. It is the older workers, however, who go forth to the flowers and blossoms and

carry back their heavy loads of nectar and pollen. The younger workers remain in the hive to nurse the baby bees and perform the functions of housekeeping and ladies-in-waiting on the queen. The fielders, or honey-gathering workers, upon their arrival at the blossom or flower draw the nectar into their honey sacks, and through a wonderful arrangement this is partially converted into honey by the time the return flight to the hive is accomplished. On almost every trip to plants and flowers bees will gather very much more food than they can consume, but the bee through an inborn instinct seems to realize that the days of bright sunshine and blossoms are of limited number and that in order to avoid starvation and maintain life something must be stored away. It is for this reason, when its own tiny appetite is satisfied, that the bee does not cease its labors and lie down to rest, but works tirelessly on carrying load after load of nectar back to the hive; there to be used for food as needed.

Besides the organs with which the bee gathers, secretes, and delivers nectar into the cells of the honeycomb, there are other parts of the body which have important functions to perform. Along the under side of the bee's body there appear, at certain seasons when food is abundant, tiny discs of wax, like fish scales, which the bees remove and use in building comb.

Bees, if permitted to swarm naturally, will increase about double each year, although some will swarm more than that, so when a beginner starts out with one or two colonies it is not many years before he has quite a large sized apiary. The cost of operation with a few colonies is

very little, and the time required for their care is of no real importance.

It is advisable that those who anticipate going into the business of keeping bees should start out with not more than one or two colonies, learning all they can about it while their colonies are increasing. In order to secure the best information on the subject, it is advisable to subscribe to some one of the bee journals published in this country and to secure some text book, such as the "A. B. C. and X. Y. Z of Bee Culture." Bulletins on bee keeping can also be obtained free of charge from the Department of Agriculture, Washington, D. C., and from the State Plant Board at Gainesville. Failures have been made by some who started in on too large a scale, not having the needed experience required in handling large numbers of hives. The subject is one that should be thoroughly studied, and one finds that the deeper he gets into it the more interesting it becomes. One of the main questions is that of selecting good stock; then it is very necessary that the bees should be properly housed in regulation hives, using comb foundation for the purpose of keeping the honey comb

straight. As stated before, the old fashioned hive, or "gum," should never be considered, as it has been conclusively proven unprofitable.

Bee keeping as an industry is now more important than in the past. The demand everywhere for honey has increased greatly. The supply is inadequate, as a result high prices have ruled, indeed, the present day bee keeper's returns from honey sales are so great that the old-time bee keeper would have thought them impossible. With the increased demand for honey and the correspondingly high prices the need is all the greater for the employment of the most scientific and improved methods in bee keeping; never before has the intelligent, thorough-going and progressive apiarist been afforded greater assurance of a rich reward. Those of you who are now engaged in bee keeping, or contemplating entering this field, will be well repaid by practicing present day methods. This applies with equal force to the man who is following bee keeping as a commercial proposition and the individual who has only a few colonies for home use.



# Co-Operative Culture of Citrus Groves. Its Advantages to the Individual Owner, to the State, and as a Business

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O. W. Sadler, M.D., Mt. Dora, Florida.

First, there are very few grove owners who have more than a smattering knowledge of horticulture as a whole; and still fewer of the multitude of details necessary for the most successful raising of the citrus tree for most profitable production and best quality fruit.

At the very beginning, the question of the best variety or varieties for quality, season and market value arises. Then comes the question of best stock, and under what conditions it should be grown. Then comes the numerous diseases and insect pests, many of which can only be identified by an expert, and the method of eradication, or control, prescribed by those of wide experience.

Next comes the excessive cost of maintaining a necessary supply of implements for effectual economic culture, pruning and spraying of small holdings. Still more difficult is it to secure intelligent, interested help, to do the work properly and economically.

In nearly every neighborhood, one can observe the deplorable condition of groves, arising from ignorance, or neglect, or both. It is very bad policy for an owner to try to maintain a property that has cost him from \$600 to \$1,000 or

more per acre, in a condition to produce but one-fourth to one-half its capacity, through avoidable causes. It is poor policy for the State, which is holding out—justly—citrus growing as one of its most inviting prospects.

For several years it has been apparent to the writer, that a better system of fruit production than management by the individual owner must exist, but no plan that would practically meet the conflicting views of the many owners, has been developed.

In November last, when disgust had reached its climax over the difficulties to be overcome in pruning, spraying and fertilizing, the writer determined on working out a plan that would work to the advantage of all.

Mindful of the American citizen's fear and jealousy of any infringement on his personal rights, and yet his growing faith in the principle of, "In union there is strength," and in co-operation, the following agreement was presented to a meeting of neighbors, representing 125 acres. After careful reading and discussion, it was adopted as a basis for organization of the *Co-operative Citrus Culture Association*. You will note it invites only

those as members who desire their groves cultivated along the lines of the best and latest information. More especially we wish you to note, that after consultation with manager and directors, the *owner* is left arbiter of his own property, and he alone is by his choice, responsible for results. The following is the agreement:

*"Know all men by these presents:* That we, the undersigned, citrus growers of Mt. Dora, Lake county, Florida, have associated ourselves together for the purpose of cultivating co-operatively, our citrus groves, and such other fruits and crops as we may determine, according to the best methods known, or that may be known in the future.

We hereby agree to subscribe twenty-five dollars (\$25.00) per acre of our holdings; and pay in cash, implements or labor, pro rata per acre, as is necessary to supply our Association with teams, wagons and other tools, implements and machinery, and an emergency fund that the manager and directors may determine necessary for the best and most economical care and cultivation of our properties.

We hereby agree to employ a general manager, who in the judgment of the directors, is the most capable of promoting the best interests of our Association, and producing the most and best fruit and crops possible, under the conditions and climate of our locality.

We hereby agree that the manager shall have the authority, and it is his duty, to hire all help necessary to prosecute the care of our properties for the most successful and economical results; also to discharge such help as may not prove sat-

isfactory, or may not be necessary, from time to time.

It shall be the duty of the manager to have general oversight of the teams, machinery and implements of all kinds, and aid the help in securing comfortable quarters and conditions. It is hereby granted, and shall be the duty, of the manager to inspect each member's property, analyze the conditions, and advise the owner concerning the method and things to be done to secure the best results.

Should there be a difference in judgment between the manager and owner, the owner reserves the right to call the Board of Directors, or other experts in the line of work or treatment involved, at the owner's expense, when such owner shall have the final say as to what and how the work shall be done; the said grower shall then give his special instructions in writing to the manager, and the work shall be done according to such instructions; the manager will file such written instructions, as a record and protection of himself and the Association, from the results of the treatment or work thus arranged.

It is hereby agreed that the business management of this Association shall be left to three owner-members of this Association, and who shall be elected annually, and known as Directors and Horticultural Advisers. They, in co-operation with the general manager, shall have authority to transact all business, and determine in a general way the principles and methods of cultivation; but in no case to impinge on any owner-member's right to *final* decision, in case of difference of opinion.



The Board of Directors shall elect one of their number as President. The manager, when employed, shall be Secretary, and keep all books and accounts for each grove in the Association.

It is hereby agreed that the labor, team work, etc., shall be charged to each grove owner at cost, including labor plus the closest estimated overhead cost, such as upkeep, manager's salary, etc., pro rata per day or hour. Such charges shall be due and payable as soon as the work is done.

It shall be the duty of the manager to render a bill for the work and expense of each job on each property, and present the same to each owner.

All monies so collected by the manager, shall be credited to the grove or owner thereof, and deposited in the Bank of Mt. Dora, to the account of the Association.

All bills or debts of the Association shall be paid by check of the Association, signed by the President, or other person authorized by the Board of Directors, accompanied by voucher signed by the manager.

We hereby agree to meet on the \_\_\_\_\_ of each month, or on call by the President, to discuss and determine such matters as are necessary or best. The Directors shall also meet at the request of the manager, or of any member whose success may depend upon their action. The manager shall make a report on any or all matters of work, conditions and finances; and the books and accounts of the Association shall be audited every three months. In Association matters, a two-thirds vote of members, and a two-

thirds vote of Directors (two Directors and the manager shall constitute a quorum), shall decide any matters as to acts or policy of the Association.

Signatures and acreage signed here."

The more the project was discussed, the more it became apparent, that the success of the plan depended upon selection of the right man as manager. The *manager must be a broad man*. He must not only have technical and mechanical knowledge, but good organizing ability, tact in handling men, and a well developed business capacity, with enthusiasm for success of the plan.

Temporary officers were elected, and the President authorized to advertise for a manager. Forty-five applicants was the result of the advertisement. A committee was selected to investigate the qualifications of the applicants. On their report, a decision was made, Mr. E. E. Truskett of Montverde being selected. He took charge on February 1st, 1920.

After three months of practical working of our plan, we are proud to say that there has never been a criticism of the plan, and every member is more than pleased with the results.

Under practical working conditions, we have found it necessary to change some minor points. For example we found it best to make a charge of fifty cents per month to cover unknowable overhead costs, and manager's salary.

Again, to cover lost time from weather and the unavoidable lost time of teams, it has been found best to charge members twenty-five cents per day over actual wage of men, and twenty-five cents a day on team work over exact cost, and thus accumulate a small surplus. Should



this amount to more than the reserve fund required, it will be rebated to growers in proportion to work done, at the end of each year.

We found our charge of \$25.00 per acre had been entirely consumed in the purchase of teams, harness, spraying machines, disc and other harrows, etc., including a Ford truck for use of the manager, and for transporting the men and tools from place to place. We would advise a new organization to make a charge of \$30.00 per acre, thus insuring a reserve fund.

We find it best to work men and teams in crews, under a manager or foreman, thus the work is done directly under the guidance of the man who is responsible for results. The manager determines by inspection, the groves where work must be done first, thus securing to each member as prompt attention as necessary. We try to buy fertilizer, feed, etc., in quantity, in the cheapest market.

So far, I believe all our members are members of the Florida Citrus Exchange, indicating, perhaps, the influence of co-operation through its education; however, as 95 per cent of the fruit in this vicinity belongs to the Exchange, our packing house putting up no fruit for independents, it might be different in a community of independents. In any case, we believe we are an influence leading to exchange ideas.

Our first idea for organization, was to do so under the charter of the Florida Citrus Exchange, which includes "cultivation" as well as marketing. As the plan is yet only local, and would not become general over the State at once, we decided to get a common stock charter,

to be operated on co-operative lines, one share for each acre or fraction. This will allow us to do any kind of business that may seem best, and work for non-members, should we have surplus help, or idle teams, all profits being credited to the Association account.

In the development of our plan we not only secure skillful and scientific culture of our groves, but are offered the co-operation of the University at Gainesville, which will give us the services of their corps of experts on insects and diseases of citrus groves; they will come and examine them, and work with our manager and foremen in securing the best that is known in culture and protection. If necessary or desirable, the University will hold two short sessions a year for training managers and foremen, and any others interested in the work, to promote knowledge of citrus culture.

Through this co-operation of the University's laboratory experts, working in the field with manager and foremen, our movement can develop into a *real practical school of citrus culture*, and our motto—"More and Better Fruit"—will have back of it the best intelligence of the State.

Already our plan has brought requests from prospective owners of groves, and people who wish to become permanent residents of our State, to be enrolled as workers in groves under the Association's care, that they may learn the proper methods of profitable grove care.

Already visitors have purchased properties because they could have them cared for by the Association, and they would not have purchased had they not been able

to secure such service. This satisfaction to investors will be a strong card in development of the State. It is our aim to give employment to as intelligent and interested help as possible, in order to secure the greatest efficiency.

*Is the scheme practical for state-wide application?*

We believe that all communities where there are holdings of fifty acres or less each, and have a co-operative spirit, can do their work better and cheaper collectively, comparing income with expense, and with less anxiety and trouble to owner than where it is done individually.

The same tools and machinery must be used for twenty as for seventy-five acres. We have members with 1 to 60, 80 and 100 acres of grove. The latter furnish all their own tools, machinery and help, and a foreman, and pay the Association fifty cents per acre per month for the manager's inspection, and buys one share of stock for each 20 acres or less, to help defray cost of running manager's car.

So far it seems best that each Association should occupy the territory that utilizes one packing house. A good live manager can, after some experience, with the aid of good *working* foremen, probably inspect and direct the work on 1,000 acres. The acreage covered by one manager should constitute one "unit." By co-operation of units, practically the same perfection of culture and management would be secured for all.

Whether a co-operation of units throughout the State may redound to the benefit of all, will have to be worked out by experience. It would seem, however, that a meeting of managers and foremen, say twice a year, with the University experts and an exchange of experiences would add greatly to *practical* knowledge.

Prof. Rolfs has expressed the wish that fifty such units be formed within five years, as there is a large number of young men developing for such work. We leave the matter for your consideration.

# Tear Stain of Florida Citrus Fruits, Its Cause and Control

By John R. Winston, U. S. Department of Agriculture, Orlando, Fla.

Tear-stain, tear-streak or withertip tear-stain as it occurs in Florida is considered one of the minor diseases of citrus fruits and for that reason has received little attention from investigators. Its effects are principally observed on the round orange and grapefruit, more noticeably and frequently, however, on the latter and to a less extent upon the other economic species of citrus.

The economic importance of this blemish is chiefly due to the financial loss to the grower resulting from lowered sale returns brought by fruit having this unsightly and unattractive appearance.

## Review of Literature.

A careful survey of the literature reveals the fact that very little has been published on the subject. The cause of tear-stain was investigated and first reported on by Prof. Rolfs (1), who is quoted as follows:

"This peculiar form of russetting manifests itself by streaks running over the fruit from the side that hangs uppermost to the point which is nearest the ground.

"The cause of this peculiar form of russetting is that somewhere above the

fruit a twig occurs which has been infested by the fungus\* and which contains the hold-over spores. Whenever a sufficient rain or dew occurs to cause a dripping from the disease-infected twig onto the fruit, the disseminating spores are liberated from the twig and carried with the rain or dew over the epidermis of the fruit. Many of the spores are left along in different places and these produce sufficient irritation to the epidermis to cause russetting along in streaks, hence we have the peculiar form of tear-staining or tear-streaks."

Again Professor Rolfs, (2), discussed the subject as follows:

"Russetting and tear-streaking can nearly always be traced back for their beginning to a small dead spur or sprig. The fungus lives in the dead spur or sprig. Water from rains and moisture following heavy dews, collect in drops on these sprigs or spurs and the drops, when they fall, carry with them numerous fungus spores. These spores come in contact with the epidermis of the fruit, and germinate, causing minute lesions on the epidermis too small for complete infection and production of anthracnose."

This explanation as presented by Professor Rolfs to the effect that the "withertip fungus," *Colletotrichum gloeosporioides*

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\**Colletotrichum gloeosporioides* mentioned in a preceding paragraph.



*ioides*, is the responsible agent seems to have been accepted by several investigators at various times, among them Fawcett (3), (4), (5) and (6); Stevens (7); Stevenson (8) and Matz (9).

On the other hand Earle and Rogers (10) recognized in the Isle of Pines two types of russetting or tear-staining said to be easily distinguishable, the one attributed to the rust mites, the other thought to be caused by a fungus. In discussing withertip they made the following statement:

"One of the serious troubles attributed to the withertip fungus in Florida is that water washing down from infected twigs will cause the serious discoloration of fruit known as 'tear-staining.' This discoloration is often confused with the work of the rust mite, though it is easily distinguished. It frequently occurs here and can always be traced to some dead twig, but we are still uncertain whether it is due to the secretions of the withertip fungus or the *Diplodia*."

The above mentioned publications are practically all that apply to Florida or nearby sections where the round orange and grapefruit are grown in large quantities. They make no reference to actual experimental data on which the fungus theory regarding the causation of tear-stain is based. However, it can not be denied that Professor Rolf's explanation is plausible, so much so that it has obtained ready acceptance without the support of published experimental data. It was not until control results very strikingly inconsistent with this theory appeared in experimental spraying tests that the validity of this theory was questioned.

### Spraying Experiments.

During the season of 1917, in connection with spraying experiments which were conducted on a bearing grapefruit grove for the control of citrus scab it was observed that tear-staining was almost entirely absent from those plots which received several applications of lime sulphur solution and quite prevalent where Bordeaux mixture had been applied during the scab spraying season. Since this first observation many similar manifestations of the lack of control of tear-stain by copper sprays have appeared in the experimental plots. Such failure has been proportional to the severity of rust mite attack.

Ordinarily the scab spraying season is followed rather closely by the period of very severe attack by rust mites. The latter are usually most abundant during May and June and are readily controlled by two or three applications of lime sulphur solution diluted 1 to 66. With this explanation at hand a more intelligent interpretation of the data in the accompanying table can be made. (See table on next page.)

In general the results of this spraying experiment show that tear-stain was controlled on Plots 3 and 5 which received applications of lime sulphur solution at the critical periods for rust mites; that tear-stain was materially reduced on Plot 4 which received applications of lime sulphur solution considerably in advance of the critical periods for rust mites; that tear-stain was not reduced on Plots 1 and 2 which received applications of copper spray mixture. On the assumption that tear-stain is caused by a species of *Colletotrichum* it would be reasonable to ex-

### Effects of Various Spray Schedules on the Control of Tear-Stain on Grapefruit.

	1	2	3	4	5	6
1917	Bordeaux	Burgundy	Bordeaux	Lime-Sulphur	Lime-Sulphur	Not Sprayed
Jan. 29	3-4-50	3-3½-50	3-4-50	1-40	1-40	
Mch. 23	"	"	"	"	"	"
Apr. 7	"	"	"	"	"	"
May 22	"	"	Lime-Sulphur 1-40	Not sprayed	"	"
June	Not sprayed	Not sprayed	Lime-Sulphur 1-66	Not sprayed	1-66	Lime-Sulphur 1-66
Tear stained:	70 per cent	38 per cent	1.3 per cent	7.5 per cent	1.25 per cent	26 per cent

Final count of 1,000 fruits from each plot made Feb. 1918.

The excessive amount of tearstained fruit on the plot sprayed with Bordeaux mixture may be explained by the fact quite frequently noted that rust mites become unusually abundant on trees sprayed with that material. The injury did not resemble Bordeaux russet but was similar in every respect to the tearstaining on Plot 6.

pect that Plots 1 and 2 should show at least as good control as Plot 4. The fact that control of tear-stain followed so closely the usual results in rust mite control is strong evidence that rust mites are largely concerned in the causation of what is generally recognized as tear-stain.

A part of a grove of grapefruit was sprayed experimentally in June, 1919, using 3-4-50 Bordeaux mixture for Plot 1, and 1-66 lime sulphur solution for Plot 2. Plot 3 was an unsprayed check. The grove had not received previous spraying that season. At the end of July Plot 2 was free from tear-staining, but Plots 1 and 3 had numerous tear-stained fruits. The fruit on Plot 2 remained bright and free from tear-stain until February, when the crop was harvested. This shows that one application of weak lime-sulphur solution well timed for rust mite control in that grove was effective for tear-stain, while the standard strengths of Bordeaux mixture applied at the same time did not reduce tear-stain.

Other experimental data secured during the past three years show, without exception, similar results.

Yothers' (11) conclusions, based on numerous extensive experiments to control rust mites in various parts of Florida is that "bright fruit," i. e., fruit free of rust mite injury is invariably free of tear-stain as well.

Growers generally throughout the Florida citrus belt have secured commercial control of tear-stain whenever they have controlled rust mites, by the established spray schedule for rust mites.

Definite observations in commercial groves show clearly the following facts: (1) When rust mites are naturally absent, tear-stain is not observed. (2) Where rust mites occur and are successfully controlled, tear-stain is also controlled. (3) Where rust mites are present but are not controlled, tear-stain occurs and varies with the severity of the rust mite attack.

Usually in Florida a small proportion of citrus bloom occurs in June. Fruit



from such bloom sets after the normal rust mite period, and, generally speaking, ripens free from tear-staining, unless rust mites happen to become abundant during the following winter or early spring months.

### Cultural Work.

Fungus spores are admittedly capable of producing tear-streak patterns on the host, for example, the melanose fungus is known to produce definite tear-streaks on various citrus fruits. Consequently an attempt was made to determine the frequency of occurrence of the so-called "withertip fungus," *Colletotrichum gloeosporioides*, in typical tear-stained areas. For this purpose oranges and grapefruit were selected which showed typical "withertip tear-stain" as well as fruit affected with rust mite russet which shaded off into tear-streaks. Cultures were made from more than 100 fruits. At least 75 per cent of these were selected in various parts of the State by persons specially chosen for their competence in recognizing typical rust mite injury and typical "withertip tear-stain." For comparison cultures were made from fruits that were free from blemishes or from unblemished areas on russeted or tear-stained fruits.

The results of this cultural work show that the "withertip" fungus is practically universally distributed on citrus fruit surfaces. It is present about equally on the average in tear-stained and russeted areas. A saprophyte type of *Cladosporium* is isolated with the same constancy as the "withertip fungus" but with less frequency. In so far as these culture tests

go, it would be about as reasonable to ascribe the injurious effects to one of these organisms as to the other, if constant isolation from lesions is to be the deciding consideration. However, neither reaches as high a frequency of occurrence as would be desirable as a basis for holding it to be the causation.

Various types of lesions on citrus fruits were examined by similar cultural methods. These included spray-burn scars, hail bruises, thorn scratches, and old citrus scab lesions. The fungus flora was very similar to that obtained from tear-stain and russet as indicated above.

### Histological Work

Rust mite russet with its several patterns and the so-called withertip russet or tear-stain intergrade imperceptibly. Ordinarily the grower in an off-hand way calls the streak effect tear-stain and the solid area rust mite russet.

It was deemed important to make a careful microscopic examination to determine whether distinctive features exist in the rind of the affected parts. Fruits were selected showing typical patterns of rust mite russet as well as those showing several degrees of the so-called withertip tear-stain.

The only conclusion that can be drawn from the histological data at hand is that it is impossible to distinguish between the rust mite russet and the so-called withertip tear-stain.

The presence of punctures in the epidermal cells of the tear-stained areas would strongly suggest the work of sucking parasites rather than that of parasitic fungi. This is further substantiated



by the following observation: In July, 1919, with the aid of a hand lens numerous tear-stained immature grapefruit were examined while still hanging on the trees in an unsprayed grove near Orlando, Florida. The rust mites and their castings were more or less generally distributed over the fruit but were present in especially large numbers over the tear-stained areas. This was very noticeable early in July. By the second of August this marked segregation of mites in streaks was not particularly evident and the mites themselves as well as their castings were nowhere present in very large numbers; however, the tear-stain, presumably caused by rust mites were quite plainly evident.

#### Inoculation Experiments.

In order to determine to what extent withertip fungus is concerned in the causation of tearstain inoculation experiments were conducted during the summer of 1919 on green grapefruit apparently free from blemishes. Similar inoculation tests were made at various times during the fall and early winter of 1919 on grapefruit approaching maturity. The inoculum was derived from dead orange and grapefruit twigs and from typical tear-stains on grapefruit.

The results were negative. Not the slightest symptom of infection could be detected on any of the fruits even as late as February, 1920, when the crop was harvested.

Observations were made to determine the frequency of association of tear-stain with dead twigs that might harbor the "withertip fungus" or other fungi. Groves were examined with more than the average amount of dead wood pres-

ent. The data indicates that dead twigs, spurs, etc. are found immediately over not more than ten per cent of the tear-stained fruit.

#### Conclusion.

While the foregoing evidence is to the effect that tear-staining of Florida citrus fruits is caused by rust mites rather than by the withertip fungus as claimed by Professor Rolfs, it must be admitted that the writer may not have seen all types of this injury. If there occurs in Florida a special type of tear-staining caused by the fungus *Colletotrichum gloeosporioides* it must have been exceedingly rare during the past three years to have escaped detection by the writer. The observational and experimental data on the control of what is regarded as "tear-stain" by investigators and Florida growers seems to be definite enough to warrant the conclusion that practically all of the so-called "withertip tear-stain" in Florida is caused by rust mites and can readily be controlled by controlling the rust mites.

A bulletin of the U. S. Department of Agriculture is now in press discussing this trouble in detail, a copy of which can be obtained when issued by writing to the Secretary of Agriculture at Washington, D. C.

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## Sulphur Compounds for Rust Mites

W. W. Yothers, Bureau of Entomology, U. S. Department of Agriculture,  
Orlando, Fla.

For several years there have been on the market powdered forms of sulphur intended to take the place of the liquid sulphur sprays. Some of these have been recently introduced into Florida and we have been in receipt of many inquiries regarding the merits of these powdered materials.

The manufacturers claim for these dry materials many advantages over the liquid sprays. The freight charges, of course, are less and the convenience in using them, no doubt, is much greater than in using the lime-sulphur solution. The claim is also made that they are equally as effective in killing pests as the lime-sulphur solution or other liquid sulphur sprays. If they are as effective more convenient and do not cost very much more than lime-sulphur solution,

then the citrus grower certainly should prefer the dry forms of sulphur.

In order to assist the grower to decide as to what material he should use, it has seemed advisable to present certain facts about these materials and the results of our experimental work. Perhaps it should be stated that only by extensive use over several seasons can the very best material be selected from among several that appear to be highly satisfactory.

In the California Monthly Bulletin, Vol. 8, No 1, George P. Gray, chemist of California Insecticide and Fungicide Laboratory, gives the following table, except the figures on Barium tetra-sulphide which were added by the writer. The sulphur content of Barium tetra-sulphide was taken from the label and the retail price was merely estimated.

Material	Average Retail Price.	Total active sulphur approx. per cent.	Cost of sulphur 100 lbs.	Amount equivalent to 1 gal. Lime sulphur solution.
Lime sulphur Solution 33° B.	11.26	26	8.03	1 gal. weighs 10.78 lbs.
Dry soda sul.	8.00	57	14.03	4.9 lbs.
Lime sul. dry	10.40	55	18.90	5.0 lbs.
Barium tetra-sulphide	10.00	68	14.70	*4.12 lbs.

\*Since the above was written Gray states that it requires 6.4 pounds to be the equivalent of one gallon of lime-sulphur solution.



An examination of the table certainly shows that if these dry materials must be used according to their sulphur content as compared with that of lime-sulphur solution they will be very expensive indeed.

The greater cost of the dry materials over the lime-sulphur solution is somewhat reduced by the greater freight charges of the latter. This difference, however, is not so great as enthusiastic salesmen might lead the growers to believe. In buying a gallon of lime-sulphur solution freight charges are paid on about  $10\frac{1}{2}$  pounds of which  $2\frac{1}{2}$  pounds is sulphur in solution. In order to obtain an equal amount of sulphur from the dry forms freight will have to be paid on approximately 5 pounds. This is due to the presence of sodium, calcium or barium as the case may be, and other inactive ingredients. While this is a saving of 50 per cent freight charges, it does not constitute any great percentage of the total cost of the spray material.

We doubt very much if the greater convenience in handling the dry forms outweighs their greater cost over the lime-sulphur solution.

The wastage of lime-sulphur solution is also brought forward as a reason that the dry forms should be used. It is not our desire to minimize this, but we doubt very much if the wastage can be much greater than that of dry soda sulphur or dry lime sulphur, which deteriorate rap-

idly on being exposed to the atmosphere. As, for example, when the top of the container is left off for a short time or when the container is damaged so as to permit the entrance of air and moisture. Barium tetra-sulphide, however, appears to deteriorate very slowly on being exposed.

It may be contended that these dry forms contain other ingredients than sulphur that may be active in killing pests or preventing fungus diseases. While this may or may not be true, at the present time the sulphur is considered to be the only effective agent in the various sulphur sprays. The question then for the grower is: Can these dry materials be used at a less strength than is indicated by their analyses? We regret to say that this is a most difficult question to answer and at present our data are incomplete and only indicative, and are here given to enable the grower to decide for himself if it is best to use these dry sulphurs exclusively or to use them experimentally. All the experimental work done in 1918 and 1919 was to determine the effect on rust mites and if any injury followed the spraying.

It should be noted that the number of rust mites was determined by counting them in an area  $\frac{1}{2}" \times \frac{1}{2}"$ , known as a "square." The same number of squares were counted for each test, an equal number of squares being counted on the upper and lower surfaces of the leaves and on the fruit.

## TEST No. I.

An experiment was conducted on young trees without fruit. It was planned to use the dry materials according to the recommendations of the manufacturers and the diluted material contains less sulphur than the lime-sulphur solution.

*Sprayed June 21.*

Materials and Strength	Mites per twenty squares		Approx. amt. sul. used
	June 27	July 12	
Lime sul. solution 1-66	0	0	1.97 lbs.
Dry lime sulphur 2-50	1 young	2	1.10 lbs.
Barium tetra-sul. 2-50	2	4	1.36 lbs.
Flowers of sul. and glue 2-50	6 young 1 adult		
Dry soda sulphur 2-50	7	1 young 14 young 22 adults	*
Check unsprayed	0	36	1.14 lbs.
	253	390	

\*When flowers of sulphur and glue were applied we used 2 pounds of sul-

phur to 50 gallons of water, but the agitation was imperfect and much sulphur was left in the bottom of the barrel.

It is most noticeable that all the sulphurs were remarkably effective as compared with the check. Even the straight sulphur sprayed on with a little glue was about as effective as any of the other forms. The lime-sulphur solution was a little more effective but there was more sulphur in the spray which may account for this.

## TEST No. II.

*Sprayed June 5, 1919.*

Material and Strength	Mites Date	Present counted
	June 11	July 17
Lime-sul. solution 1-66	0	11
Dry lime sul. 3 3-8 lb.-50	0	3
Dry soda sulphur 2-50	0	60
Barium tetra-sul. 2-50	0	23
Check	107	786

It is most interesting to note that where dry lime sulphur was used so that the diluted material contained as much sulphur in solution as the test with lime-sulphur solution, the mites were killed equally as well and the effect seemed to be equally as lasting. The other two tests showed more mites on July 17th because there was less sulphur in the spray material.

## TEST No. III.

*Sprayed July 7th and 8th, 1919.*

Showing the relative value of various forms of sulphur for rust mites.

Material and Strength	Mites per 90 squ' res	Mites per 60 squares	
	July 11	August 20	
Lime-sulphur solution 1-66	0	363	outside row
Dry lime sulphur 2-50	11	350	
Barium tetra sulphide 2-50	0	817	outside row
Barium tetra sulphide 2½-50	27	1167	outside row
Flowers of sulphur 2-50	1	208	
Dry soda sulphur 2-50	48	212	
Check unsprayed	23	681	

An examination of the above results show that even on the unsprayed check the mites did not get abundant enough to demand spraying for bright fruit. They also show that all forms were about equally effective including the flowers of sulphur, the lime-sulphur solution being a little the best. It should be noted that Barium tetra-sulphide was used mostly on outside rows where rust mites usually

get much more abundant than on inside rows.

In 1918 tests were made with several dry forms of sulphur using them so that the diluted materials would contain equal amounts of sulphur. This was done with dry lime sulphur, but it was thought unwise to use dry soda sulphur so strong because of the liability to injury. The results are given in the following table:

## TEST IV.

*Comparative number of rust mites present after spraying.*

Material and Strength	Date of Examination		
	May 14	June 4	July 2
Dry soda sulphur, 5 lbs. to 100 gals.	1	36	2414
Dry lime sulphur, 7½ lbs. to 100 gals.	0	8	1357
Lime-sulphur solution, 1-66	2	49	534
Lime-sulphur solution, 1-40	0	6	530
Lime-sulphur solution, 1-40	1	6	1511
Check, none	568	107	969

Note: Only one-half as many squares were counted in check. To compare these with above figures they should be doubled.



An examination of the above table certainly indicates that if the dry forms are used strong enough, satisfactory results may be expected, but in no instance have they been superior to lime-sulphur solution.

In order to determine the comparative value of Barium tetra-sulphide and lime-sulphur solution in killing rust mites additional tests were conducted.

On June 14, about ten trees each were sprayed with various strengths of the above sulphurs. The results are given in the following table:

gallons of each material sprayed on July 10 and only one count made on July 15. The 30 squares counted from trees sprayed with lime-sulphur solution 1-66 had 1 rust mite and 30 squares counted from trees sprayed with Barium tetra-sulphide 2 pounds to 50 gallons of water had 89 mites. These same trees had 891 mites on 30 squares June 24 about two weeks before the spraying.

### Injury.

No injury to the fruit or foliage fol-

### TEST No. V.

*Number of rust mites present on thirty squares per examination on trees and fruit sprayed with Barium tetra-sulphide and lime-sulphur solution.*

Material and Strength	Date Counted		
	June 24	July 11	Aug. 9
Lime-sulphur solution, 1-66	0	5	474
Barium tetra-sulphide, 1½-50	1	35	347
Lime-sulphur solution, 1-50	2	0	358
Barium tetra-sulphide, 2-50	2	63	713
Lime-sulphur solution, 2-50	0	0	10
Barium tetra-sulphide, 4-50	0	1	17
Unsprayed check	753	597	

The above results indicate that all tests were fairly satisfactory, but in nearly every instance the lime-sulphur tests showed fewer mites than Barium tetra-sulphide. When four pounds of Barium tetra-sulphide was used the results were highly satisfactory and perhaps equal to lime-sulphur solution. It may be that 3 to 3½ pounds to 50 gallons of water will be found to be sufficient for rust mite control.

A test was made in a grove using 200

lowed any of the tests mentioned in this article. In another test Barium tetra-sulphide, 6 pounds to 50 gallons of water, caused no damage. It appears that this is a very safe spray. Dry lime sulphur did no damage when 3 3-8 pounds to 50 gallons of water were used, but further tests should be made. It is rather doubtful if dry soda sulphur can be used on a sulphur content basis because in all probability 5 pounds to 50 gallons of water will cause damage.

### Summary and Conclusions.

(1) It is reasonably certain that dry sulphur compounds, if used on the basis of their sulphur content will give satisfactory results in controlling rust mites.

(2) In all practical tests where these were used so that the sulphur in solution was very much less than that contained in lime-sulphur solution the latter showed up somewhat better. Future experiments may show that these can be used slightly under the sulphur content basis.

(3) No injury followed any test.

(4) It is very doubtful if dry soda sulphur can be used on the sulphur content basis, because of liability to damage. It is our opinion that this form fills a most important place in that it mixes thoroughly with all oil emulsions, thus making a combination spray for whitefly, scale insects and rust mites.

(5) We advise the citrus growers to try out on a small scale all these dry forms on two distinct bases, viz., on sulphur content basis and on cost basis.

Mr. Hume: Are there any questions you would like to ask?

Dr. Sadler: I would like to ask if five

pounds of Niagara soluble sulphur would be dangerous in fifty gallons?

Mr. Yothers: I think so.

Mr. Skinner: I would like to ask one question; have you noticed in this dusting whether it keeps down the scale?

Mr. Yothers: Of course, you understand that these dry forms of sulphur I have mentioned are those which are put back in solution. Now, in regard to dusting, all the data that I have on dusting I gave at the Citrus Seminar last fall, but Mr. Thompson, at Winter Haven, has purchased a new machine, and I have bought sulphur and we are going to work it out there this summer.

Mr. ———: I am going to ask if you think Barium tetra-sulphide is affected by the weather? Does it become hard?

Mr. Yothers: A small quantity was exposed to the atmosphere during three months last summer. No changes could be detected with the naked eye but about one-fourth failed to go in solution at the end of that time. This test was corroborated by the chemist afterwards. It should be stated that the percentage of insolubility was not known before the material was exposed.

# The Growing of Satsuma Oranges in Alabama

O. E. F. Winberg, Silverhill, Alabama.

Mr. Hume: Over in the neighboring State of Alabama, the orange industry has been under way for some years. Naturally, Floridians are interested in what has happened over there. I am going to introduce to you now, Dr. Winberg, of Alabama, who is a large grower of Satsuma oranges and a member of the Alabama State Board of Horticulture, which corresponds to our Plant Board, and Dr. Winberg will now talk to you on Satsuma oranges in Alabama.

Dr. Winberg: The best that I can do, I believe, for this audience, is to give a brief resume of what we have done in Alabama since Satsuma orange growing was first established in that State. As far as our record goes, the first Satsuma orange in Alabama was planted in 1897, and I find that three trees survived the low temperature in 1899. Since that time there was very little planting, up to 1909. In 1909 there were only one hundred acres planted to the Satsuma orange in Alabama. In 1910 the Satsuma orange plantings started on a commercial scale and continued to grow so that after the planting season of 1916 there were over 16,000 acres in Satsuma oranges in Alabama. Then came the severe storm that swept over the Gulf Coast territory in July, 1916, followed by the freeze in 1917, and reduced the Satsuma orange plantings in the State by 3,500 acres. It

was a very severe set back. However, in discussing the Satsuma orange culture in Alabama, I wish to call attention to several factors that contributed to these reverses.

There is always danger when any new horticultural project starts anywhere, that they will be over-enthusiastic. Then people get so over-enthusiastic that they fail to calculate the cost; fail to take into consideration the factors which underlie such important development. When it is only a question of the planting of truck crops, it is different, but when it is a question of planting something that will last for many, many years, then I believe it should be considered a pure and simple business proposition, and the cost be taken into consideration. In this case, by reason of the over-enthusiasm, these things were not considered. The mistakes committed were these: First, the 3,500 acres that suffered as a result of the storm and freeze of '16-'17 was due principally to their improper location. Orange trees should not have been planted where they were planted; conditions were not right; location was not right. Second, they had gotten it into their heads that they could plant an orange tree in the ground, leave it and go back North. It didn't work. The orange tree requires attention. Third, they had not taken into considera-



tion the cost, and when they were advised that in order to make this a paying proposition, they had to put in so much money, they got discouraged. Their trees were neglected. When we told them they needed to pay out money in order to make their investment good, they would not do it. They got afflicted with the disease we call "cold feet," a very serious one. And in 1916 when the canker situation in our State was extremely bad, I learned that there was a would-be scientist who advocated that they should plant Bermuda grass in the grove and let it grow. That would harden the trees to such an extent that the canker would have no effect whatever. That was better than the State's constant preaching about spraying and pruning, cultivation and fertilization, because the Bermuda grass proposition was only an initial small expense and after that nothing but rest. So one party planted 250 acres into Bermuda and went home and set down.

At the annual meeting of our Horticultural Society in 1918, he came and told us that it didn't work. All his trees had frozen down. Now the things that were responsible for the set back in 1916 and 1917 were principally the factors that I have mentioned, but probably most of all, insufficient care; in other words, simple neglect. Wherever we had an orange grove that had been given reasonable care the trees did not suffer. They suffered from defoliation, it is true, but they grew during the summer and gave a good crop the following year. On the other hand, where the trees had not received sufficient nourishment and sufficient cultivation the trees died in large numbers.

Now, I maintain that to establish an industry of this kind, the reverses that I have referred to are necessary. I maintain that it was about the best thing that could have happened in our State that the freezes and storm came, because if they had not come the enthusiasm would have continued to grow and would never have stopped. But this gave them a chance to stop and think and consider some of those things which some of us foolish people are constantly preaching, the care of the orchard. They found that that was actually a good thing.

Since 1915 I have been preaching over and over again on every occasion, the necessity for spraying, the necessity for cultivation, the necessity for fertilization, and the spraying, probably, has been the hardest of all of which to convince the people. The fertilization and cultivation is a combined proposition of which they can see the result, but when it comes to the elimination of insects, they cannot see its importance and it is hard.

Not until last fall when the growers lost at the rate of approximately \$100 an acre as the result of the damage caused by the purple scale, did they realize the necessity of spraying, and therefore these adverse conditions are often a lesson. Now to come back to conditions as they have developed, one factor that has done much to eliminate unnecessary and undue speculation was no doubt the citrus canker, because we had a quarantine notice up in the orchards where the disease was found. When these speculators came they didn't like it, because they had been told that there was no such thing as a disease attacking a Satsuma, and when they found out that the grove actually had

such evils as that they got discouraged. Now, don't understand that this was averse to development, indeed not. But I believe above all things that we should go after things in a conservative way. Let us not hide anything, but when we tell the people to come down from the North to settle and induce them to invest their capital, tell them the facts. Then I believe we can eliminate 90 per cent of the disease called "cold feet."

Notwithstanding the adverse conditions, we have now in Alabama 14,000 acres in Satsumas, 12,000 acres of which are in bearing this year and two thousand acres of new plantings. We have during this year established a market for Satsumas. When we started our organization there in 1914-15 we sent one of our men up north to find a market for our fruit. He came back very discouraged. He had been in some of the principal marketing centers, but found none that would give him much consideration, but we have given that up and we have now, I believe, solved the question of marketing. We have standardized our fruit. We have, in co-operation with the U. S. Department of Agriculture, segregated our fruit into respective varieties of Satsumas. The packing question is partly solved. Packing houses are being established in various parts of the State (that is in what we call the Satsuma belt of the State), and we will need these packing centers. This fall we will have seven modern packing houses in operation. The crop is small yet, the trees are young. In fact we have just now reached the point where the trees have recuperated so that they are in the same condition and size and otherwise as they were prior

to the freeze of 1917, as they were very severely cut back, after freezing.

If these things had not happened, we would have shipped a good many carloads, but as it is, our maximum output this year will not exceed 150 carloads. But we believe that the Satsuma industry in Alabama is on a firm footing. We have eliminated the undesirable factors; we have established co-operation; we have tried to standardize our methods of cultivation, fertilization, spraying, etc.

With such modifications as may be necessary in different localities there is one thing that I believe is absolutely necessary in pioneering horticulture, and that is co-operation. Had we not been able to affect a measure of co-operation among the people engaged in the industry, we would have had very few Satsuma orange trees left today and the industry would not have amounted to anything.

When we started in Alabama we knew nothing about citrus culture, and I want to take this opportunity to express, on behalf of the growers, our appreciation to the citrus growers of Florida for their co-operation. There has been no time when I have called upon the Florida people for assistance, when they have not given it and that has been a great help. I believe that our pioneering days are mostly over. We have reached firm ground and if no natural calamities come along, I believe that the Satsuma industry on the Gulf Coast, particularly in South Alabama, will be an important factor in fruit growing on the Gulf Coast, and I hope that it will extend into this State and into Mississippi.



These three states, I think, are best adapted to Satsuma orange culture.

To outline anything in particular of what we are doing there, I will not take your time in doing. I will say, however, in reference to our cultivation methods, that it has been a considerable task to get the growers to cultivate. If they had started intensive cultivation in the spring and then stopped cultivation in July, of course, it would have been the best policy. But I found it necessary to advocate extending cultivation into August and as far up as September first, in the young orchards, for the reason that it was nearly impossible to get the people to do intensive cultivation in the young orchards in the first part of the season. And, consequently, where they did not do intensive cultivation at that time, their trees did not get the benefit of the fertilizer they put on in their orchards; the weeds got ahead of the trees and the trees went into a dormant state in the fall in a very weakened condition. That was the principal reason why so many trees died as a result of the freeze in 1917. On the other hand, where we continued cultivation over a longer period of time, the trees went into a dormant state in a vigorous condition, and they survived. Therefore, we are advocating, in Alabama, the cultivation in particular of the young trees up to September first.

We plant legumes in the young or-

chards planted this year and even orchards three years old, and cultivate on each side of the trees, and we find that a better method to develop a tree quicker and hardier than by the other method. When it comes to the bearing trees we, of course, cannot pursue that method. We tried to follow the same method in bearing orchards, cultivating up to the first or fifteenth of September, but that prolongs the ripening of the fruit, and when the fruit should be ripe it was then green and we were then approaching a new danger, that of being caught by the frost in the fall.

There are some problems that we have solved, and there are a good many problems to be solved. There is one thing that we are particularly interested in and proud of and that is the co-operation that we have received from the U. S. Department of Agriculture. That applies particularly to the segregating of the varieties and the establishing of tree records. These things, I believe, are of the greatest importance and I hope that in two more years there will not be an orchard of any consequence in the citrus area of Alabama where we do not have records, that together with the segregation of varieties will bring us another step forward. I think I have taken up your time long enough. I thank you very much for this opportunity of being with you.



## Fruit Products in Florida

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C. E. Stewart, Jr., Tampa, Florida.

I am not going to make an address this evening on fruit production. I was appointed by Mr. Hume to act as chairman of a committee to discuss "By-Products of Fruits in Florida," at the meeting this evening, and you know a chairman is one who does not do any actual work, but delegates that to others who can do it far better than he can.

I do want to say just a word or two, though, about what by-products mean to Florida. In the first place when we organized the Horticultural Society, or rather when the Horticultural Society was organized (I did not happen to be present at the time, so I can't say we), it was realized that we had an industry in Florida, in the growing of citrus and other fruits, and that it would be well for us to get together and talk over the many, many things that came up in the pursuit of our business and to have an interchange of ideas.

Now, no industry is successful unless the first step is the elimination of waste. When I was a youngster I had my early business training with the Standard Oil Company. I sold refined oils, gas, and kerosene to a very large territory, and I will say in passing, in those days we used to sell gas for 6½ cents a gallon and it was common knowledge to all of us that we could give away the gas and kerosene and make ample dividends on

the remainder or by-products, which ran from the lubricating oils into the heavier crude grades and then on down to the paraffin oils. When they got through with that, they had a carbon clinker they used for electrical purposes. They started next into the manufacture of burning oil, illuminating oil, and gas or naphtha as it was called in those days. They so developed their business that they could afford to give away the real thing they started after. The packers in Chicago made their best business by eliminating waste, and we are up against the same thing here in Florida.

Now it is certain that most of the interest up to the present time that has been shown in the by-products of Florida, with one or two exceptions, has come from the outside of the State, because the people who come down here and see our fruit on the ground, ask our growers what they do with the fruit that is on the ground. We don't do anything with it. Now we know that dropped and cull fruit would not carry to the market satisfactorily, but that it has the same properties and will make just as good by-products as the fruit that is sound and strong enough to carry to market.

The industrial development of Florida has not arrived in the way of manufacturing. We have come a long road and a hard road, too, and notwith-

standing some very slanderous things that were said about our State in the Country Gentleman, we have a paying business here in the growing of citrus and other fruits. We find that the soil is plenty good enough, but the manufacturing development of Florida has not come; but when it does come, I predict that one of the largest developments will be along the line of the manufacturing of by-products from our fruits in Florida.

The Horticultural Society should be interested in this because it will eliminate waste from our business and we should have here tonight the freest discussion,

and the greatest interchange of ideas possible, so that each one of you can carry away some new thought that you have gotten here this evening from papers read and from questions answered from the floor.

I have been using up a little time here until my first speaker arrived. I see that he has now come, and I take great pleasure in introducing Mr. J. W. Sample, who was one of the pioneers of the preservation of grapefruit juice, and let me say right here, grapefruit juice is going to be the national drink.

## Citrus Fruit By-Products

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J. W. Sample, Haines City, Florida.

The necessity for some method of utilizing our cull, off-grade, or unmerchantable citrus fruits in Florida has prompted quite a number of our enterprising citizens to devise ways and means for converting these low-grade fruits into merchantable products, and has already resulted in the establishment of some factories for this purpose.

That the low-grade citrus fruits can be converted into food stuffs as by-products has been successfully demonstrated, as several factories are now operating in the manufacture of juices, marmalades, jellies, pectins, candied peel, vinegar and essential oils.

Most of the efforts in the preparation of grapefruit juice have proven failures, due largely to the fact that an attempt was made to pasteurize and express the juice with some of the pulp held in suspension. But there are some factories now in operation which are putting out a clear grapefruit juice successfully, and in my opinion there is no better fruit juice drink on the market. The only question is to get it to the consumer in an unfermented, palatable form. (Some people might not object, however, to its being fermented if it had a "kick" in it.)

The citrus fruit growers are just at this time confronted with a great loss by virtue of the fact that they have been unable to market their grapefruit, due, in a

measure, to lack of transportation facilities, strikes, etc., demonstrating very clearly that they need some avenue for disposing of this class of fruit and a prevention of this great waste. This season, in many instances, half of the crop of grapefruit has dropped to the ground and decayed, while if we had had by-products factories to utilize these drops, the growers would not have suffered such a loss. I have information that there are now some factories in contemplation to help take care of this enormous amount of unused fruit. Surely no food product should go to waste under existing conditions, when everyone is complaining of and fighting the high cost of living.

In my opinion the greatest attainment in by-products production is the marmalade base, which is to be used principally in the manufacture of marmalades. There seems to be practically an unlimited demand for this product, and at remunerative prices. There also appears to be a great future for the pectin to be procured from our citrus fruits. It is being separated now in large quantities, and is taking the place of apple pectin, which has heretofore been so popular.

Orange juice has been converted into a dehydrated form, which is reduced to a powder. It is palatable and delightful, but not practical commercially. The essential oils, however, obtained from or-



anges, lemons and limes are of great value, and are very scarce, as practically all of such oils are imported. Prof. E. M. Chase, Chemist-in-Charge, Citrus By-Products Laboratory, U. S. Department of Agriculture, of Los Angeles, California, has achieved some success in the separation of these.

"Necessity being the mother of invention," has turned many of our good people to studying this problem of the utilization of our unmerchantable citrus fruits—more particularly grapefruit, as our loss from the dropping of grapefruit is much greater than that of oranges, and the field for developing by-products from grapefruit is more extensive than that of oranges. I speak more particularly of the base products—juice and pectin.

Just suppose, for illustration, that we were selling all of our cull grapefruit, which I believe this year will amount to over 2,000,000 boxes to these factories at \$1.00 per box. This would mean a saving to the growers of \$2,000,000. Then again, we might add to this another million boxes, which we could very easily spare from our fourth grade, or Duke brand. By this method, we would not only get all that this grade of fruit was worth, but we would eliminate a low grade from the market. By offering for sale only our best grades of fruit, we would obtain better prices, as the poorer, or cheaper, grades would not interfere. As I see the marketing conditions it is the off sizes and imperfections in the fruit

that reduce our prices so materially. Good fruit will always bring good prices.

When the grower realizes that it has cost him just as much to produce the fruit that has dropped to the ground and decayed, or has been culled by the packing house and hauled to the dump, then only will he put forth his best efforts to have this class of fruit converted into some product which will prove a profit to him.

We have not, as yet, been able to establish a market for our low-grade fruit except to put it in competition with our good fruit. This has proven a menace, because the housewife who goes to the merchant to purchase oranges or grapefruit usually asks the price with no consideration as to grade, quality or size. Thus the low-grade fruit often establishes the price of good fruit as the merchant who can sell the most fruit for the least money, regardless of grade, quality or size gets the business. It behooves us to make some provision for the utilization of these poorer off-grade fruits.

By the co-operation of the growers, factories can be established to utilize these fruits, and I may say this is now being done in Polk county, by the Florida Citrus Exchange through its tributary organizations. From present prospects this by-product adjunct is going to prove more beneficial to the grower of citrus fruits than any other factor, except the Exchange itself.

## Citrus Fruits as Foods

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Mrs. C. M. Berry, Sanford, Florida.

The privilege was granted me of changing the subject upon which I was asked to speak to you tonight to "Citrus Fruits as Foods," and I am also going to ask the privilege of being somewhat personal. You may feel more certain of some knowledge of my subject when you know I was brought up in an orange grove (in which there were also grapefruit, limes, lemons, kumquats and citrons); that I married a man interested in citrus fruits; and that there were eight physicians in my family, who instinctively gave a health bias to my viewpoint of all fruits.

As I look back now one of the chief occupations of my youthful years seems to have been wandering through the grove, picking up drops and picking off sandspurs and then critically testing them—the oranges; the sandspurs tested me. The effect was quite the opposite of that experienced by the old lady who was allowed to have her own sweet will in a certain peach orchard one afternoon. When she came back she very frankly told the owner that there was not one good peach in the orchard. She said she knew, because she had eaten a peach from each of his five hundred trees! I must have eaten thousands of oranges and grapefruit while I was growing up, but they

all seemed good and to me there is still nothing in the world equal to Florida grapefruit and oranges.

During those years there was constant experimenting going on in our kitchen which taught me that citrus fruits are quite as susceptible of cookery as other fruits, and the comparison was easy because we had over twenty varieties of fruit on the place. But it was also borne in upon me that Florida citrus fruits are to be had practically the year round; that their flavor is best in the uncooked state and that they are more quickly and easily prepared uncooked. This knowledge stood me in good stead when I was married. Do not, however, for one moment think that I spared myself, or my husband, in order to obtain knowledge only to be gained by personal cookery of citrus fruits. What my husband has been through must be left to the imagination, for though he could speak feelingly upon the subject he fortunately has not the opportunity at the moment, and I shall not try to tell you because he has friends in the audience and I do not believe in encouraging the mob-spirit, especially toward myself.

Until very recently indeed, when we were scientifically introduced to the life-giving vitamins, no one has

known exactly why the juice of thoroughly ripe oranges is so wholesome, although for an indefinite period the more acid types of citrus fruits have been recognized as preventatives of scurvy. Our former chief chemist, Dr. H. W. Wiley, now at the head of the Good Housekeeping Bureau of Research, has for many years constantly and consistently preached the health value of citrus fruits and citrus-growing countries owe him a great debt. I do not mean to say that he has been alone in recommending these fruits from a health standpoint, but he was a pioneer in it and he has had almost unlimited opportunities for publishing broadcast the particular benefits of orange juice for invalids and babies as well as for those in normal, adult strength. "Now," as he himself says, "practically every physician in the land who gives to infants or young children pasteurized or sterilized milk, advises the use of orange juice in connection therewith," for there are marvelous antiscorbutic vitamins contained in it. As we know, grapefruit juice is now also almost universally recommended by physicians of standing not only in cases of sickness but in health, as a preventive of sickness since it is a wonderful tonic. The Florida Grower recently quoted Prof. Osborne, who, in the Rural New Yorker, mentioned the valuable vitamin content of citrus fruits. These vitamins aid in nourishing the body and are stimulants to growth—stimulants of the best type, and citrus regions should preach permanent prohibition if only for business

reasons for prohibition will boom the advertising of thirst-quenching, health-stimulating citrus drinks and it is high time that the governor of North Carolina and the governor of South Carolina took a hand in the campaign.

Just here I want to tell you a Sunday school story. Eunice, the 5-year-old daughter of one of my doctor cousins, was a member of an infant class of nearly fifty little tots. One day, after what the teacher hoped had been a most impressive and inspiring Bible lesson on the sources of good and evil, she said, "Now children, I want some little girl or boy to tell me why, some mornings, we wake up feeling fussy and cross." Eunice so promptly and violently raised and flapped her hand that the teacher beamingly said, "Well, Eunice, you tell us the trouble!" And the doctor's little daughter piped up, clear and strong, "It's because the gastric juice doesn't flow right!" Let us remember, as a corollary, that the gastric juice is more apt to flow right when we get enough Florida grapefruit and oranges.

In trying to treat our "gastric juice" with proper respect let us also remember that the vitamins contained in citrus fruits best act upon our systems when these fruits are uncooked, and there is almost unlimited range in this uncooked form. The undiluted or slightly diluted juice of Florida grapefruit or oranges is incomparable as a drink. And there is a world of wholesome and enticing beverage possibilities in blends of the juices of citrus fruits alone or blends of citrus with



other fruit juices. We may use these drinks hot with benefit, but in this case heat them just hot enough to drink or add hot water to the fruit juices. Remember that to get the most beneficial and delicious results the juice used should not be heated beyond an absolutely necessary point—far below simmering.

There are many people who are afraid to use grapefruit and oranges freely for fear of acidity. As a matter of fact thoroughly ripe, sun-matured Florida grapefruit and oranges of themselves have an alkaline reaction. But I will not answer for what may happen if you add much sugar or if you eat unripe fruit. The green fruit law is more than a commercial law. It is a safeguard to health, and if those who break it might be punished not only in pocketbook and reputation, but could also be dealt with by the State Board of Health in some drastic fashion—say a neat little brand on the forehead, in the good old dark ages style, there will be still fewer offenders.

Please remember that in speaking of ripe oranges and grapefruit I speak of our sun-ripened Florida fruit. I refuse to be responsible for recommending the unlimited use of that grown elsewhere, even in the advertised flawless California, although I know all about California from a sister who lives there, and have come to thoroughly understand that they have only perfect fruit in that state; just as I have come to understand that California never has earthquakes or frosts and that what other people call California

freezes have no damaging effect what—even upon the perfect, California fruit.

In addition to citrus fruit drinks there are ices, desserts and salads in which we may employ uncooked citrus fruit juices. Uncooked desserts and ices may, of course, evolve into very elaborate affairs, but I would urge simplicity in their preparation and, where accessories are desired, that these should be other Florida fruits, or our native pecans or cocoanut, or some other State-grown product.

As to salads, in the hundreds of combinations possible by the use of citrus fruits with other fruits or with vegetables, I would urge the more frequent use of the simple, French dressing (but reversing the rule, and using but one tablespoonful of oil to three of, *not* vinegar, but *grapefruit* juice); and that you use Florida grapefruit juice in mayonnaise, as well. However, if you have an insatiable craving for a more concentrated acid then, in this, too, help create the demand for Florida products by asking for—or, if you have them at home—using Florida lemons, which have a rarely delicate and delicious acid; or use our fragrant Florida limes or that romantic reminder of the Spaniard in Florida, the aromatic Seville, or wild, sour orange.

Even more types of marmalade may be made from our citrus fruits than there are presidential candidates. Also innumerable exquisite confections can be made from oranges and grapefruit. However, I am not going to dwell upon these as domestic products because I personally prefer to avoid

gloomy feelings and certainly wish you all to be quite happy and cheerful this evening. So, with the present sugar outlook it is safer to avoid this painful subject as far as possible for the present. Of course candies may be made from various syrups which do not involve serious amounts of sugar. And they may be made from honey, as may marmalade, too; but honey is high, also, and anyhow, there is no good reason why we should not, in Florida have all the sugar we need—not all we want. We usually want and eat too much sugar; but candied citrus fruits are among the most wholesome types of confections and marmalade has its place in the category of sweets; and when we use our opportunities to make Florida cane sugar, we can help our citrus industry that much more and prevent the tragedy of sugar shortages.

As to citrus fruits in cookery, variety in food is sometimes as necessary to health as are a sufficient number of calories. So if your souls crave cooked fruit dishes, by all means give yourselves the pleasure of trying them, for there are innumerable delicacies and substantial dishes to be made from cooked citrus fruits. But think before you cook and do not be defrauded of your full State rights and imagine,

from some hypnotic magazine suggestion, for instance, that a lemon pie or lemon something else is absolutely essential to your happiness and success in life (unless you can get Florida lemons), because our sweet Florida grapefruit and oranges will both save sugar and fulfill your most felicitous hopes in pie and in other artistic and blissful concoctions; or you can use Florida limes, instead. You will understand, of course, that Florida citrus fruits have nothing at all in common with that obnoxious, "just as good," substitute idea. Florida citrus fruits are not "just as good," they are *better*.

Health, we may consider as one-fourth of our subject. The uncooked forms of citrus fruits, let us call the second quarter; and cooked dishes, the third quarter. As to the fourth quarter, I will tell you a story. A certain housewife had an Irish cook who was famous for her coffee, and one day her mistress called Bridget in to tell a caller just how she made this heavenly brew. "It's a mixer," explained Bridget, "wan quarther Mocha, wan quarther Java, and wan quarther Rio." "And what is the fourth quarter?" asked the caller. "Oh," said Bridget wisely, "that's where people makes their mistakes. It's puttin' in the fourth quarther that spiles it all."

# Muscadine Grapes and Grape Products

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Charles Dearing, United States Department of Agriculture, Washington, D. C.

I am pleased to have this opportunity to meet with the Horticulturists of Florida. It is good to return to the State where I began Muscadine grape work for the Bureau of Plant Industry eleven years ago; and appropriate to report back to you on the progress made since that time, for this progress is due in large measure to the Experiment Station and the horticulturists of Florida who gave cordial co-operation at the start and have been rendering substantial assistance ever since. Here at Ocala, I conducted my first Muscadine grape breeding work for the U. S. Department of Agriculture, though I also worked in the New Smyrna district and at Glen St. Mary that same season. I am, moreover, glad to have this chance to direct attention to the adaptability of north Florida for Muscadine grape production and suggest that you give consideration to the developments taking place in the industry. I wish, in addition, to solicit your continued support, collectively and individually, for the Department's activities in the hope that our joint effort will have sufficient momentum to cause real benefit through the development of a larger and greater Muscadine grape industry in the South-East.

In general, the aim of the U. S. Department of Agriculture Muscadine grape project is to foster by means of investi-

gational work; educational work; and co-operation with other agricultural, educational and industrial agencies; the development of a great fruit industry for the southeastern United States—an industry which will mean the utilization of part of our idle lands; sales for nurserymen; attractive and profitable employment for horticulturists, farmers, and laborers; means to attain an education for boys and girls in demonstration clubs; business for merchants; tonnage for railroads; and delicious fruit and fruit products for all.

The Department's *reason* for having undertaken this work, if additional reason need be stated, is that we believe firmly that the development of the native fruits and other economic plants of a region is a sound policy even though recognizing (as evidenced by the Bureau's office of Foreign Seed and Plant Introduction) the desirability of introducing and testing the plants of other regions.

In the case of the grape the policy of developing the native species is fully vindicated by grape history. The grape industry of the Old World is largely the result of years and years of plant breeding and selection of better varieties from the native grape of Europe. This European grape was then introduced into the northeastern United States, but the in-



dustry there was characterized by a long series of failures until John Adham, Ephriam Bull, E. S. Rogers, Jacob Moore and others resorted to the native "Fox grape" and by selection and breeding presented to the public such grapes as Catawba, Concord, Salem and Moore's Early. In the Central West, Herman Jaeger, Jacob Rounnel and others produced varieties from the native "River-Bank grape" and "Summer grape" of the region which were capable of withstanding the dry hot summer climate in Missouri and the neighboring states. In Texas, grape growing became an industry when T. V. Munson developed the native "Post Oak grape," giving us varieties of it such as the "Brilliant," and following up the work of Jaegar and others with the "Summer grape." The European grape industry on the Pacific Coast was saved from the destructive *Phylloxera* only by resorting to our native grapes as a stock on which to graft a top of the foreign type. In the tropics only the tropical species seem to withstand the Nematode. And in the Muscadine grape region—the southeastern United States—we have planted and replanted the grapes of other regions only to see them succumb in time to insect, disease or physiological trouble\* under our climatic and soil conditions while our native Muscadine grapes grow to majestic stature and abundant old age; furnishing, each year, a yield of luscious quality and full measure, even though carelessly tended, with a steady sureness and regularity almost beyond comparison.

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\*This does not apply to Appalachia.

The work of the Bureau of Plant Industry with Muscadine grapes may be classified under four general divisions; namely, Survey Investigations, Production Investigations, Breeding Investigations and Utilization Investigations, and for convenience I shall describe our work briefly under these headings.

*Field Surveys* were the first investigational work attempted by the Department. This work extended all over the Muscadine grape territory and was preliminary to the establishment of special stations where investigations of a more technical nature might be pursued. This survey work yielded a thorough knowledge of the botany, early history, and nature of the Muscadine grape; its distribution; its good and bad features; its peculiarities; and its present status. In addition an extensive collection of standard and also little known but promising varieties was secured and planted at Willard, N. C., by co-operative agreement with the North Carolina Department of Agriculture as the nucleus of a large Muscadine grape experiment vineyard. This varietal collection has furnished material for grape-breeding investigation and has served as a comprehensive test of Muscadine grape varieties. Each year to the extent that our appropriation permits we endeavor to do enough field survey work to keep informed on annual yields, market conditions, and developments in the industry.

*Production investigations* began with the establishment of the Willard Experiment Vineyard. Here we investigate all matters relating to the production of the fruit crop. We study and develop the

best and most practical methods of propagating vines; fertilizing the vineyard; vineyard culture and inter-cropping; pruning; training; harvesting; handling; marketing, etc. We have, moreover, conducted very extensive pollination studies in relation to fruit production. The information gained from all these investigations has been published in large measure and if you are not familiar with it you may become so by writing to the Department for Farmers' Bulletin 709.

Simultaneously with the study of production problems the Department inaugurated its *Muscadine grape-breeding work*. Time will not permit of a full discussion, but I should state that this is, perhaps, the Department's most important contribution to southern viticulture—an expensive and indeterminate contribution which, if supported financially by Congress, will continue until the South's native grape has been completely ameliorated.

Breeding work is slow work and we have had only a ten-year period of effort in comparison with the centuries of breeding and selection of European grapes. Yet, even in this relatively brief period, very important progress has been made, thus indicating the great possibilities for progress with this substantial type of grape.

In substantiation of the foregoing statement let me cite some results obtained by the Department. From the more than 10,000 seedling vines produced, we have already selected more than 20 individuals, which are new varieties, and are considered worthy of complete test with a view to introduction to the public. We have, moreover, successfully hybrid-

ized the Muscadine grape and other species securing a collection of grapes of intermediate character. The oldest of these hybrids have fruited and show promise. The most important result of the breeding work, however, is the production of self-fertile Muscadine grapes. We now have over 1,000 individual seedlings of this type though such a Muscadine grape was unknown when our breeding work was started. All varieties, heretofore, required cross pollination with male or staminate vines; insects doing the cross pollination. Now we have high quality, productive, self-fertile varieties; varieties not only valuable in themselves, but suitable for pollenizing the older varieties like Scuppernong, James, and Thomas. These varieties are of importance in breeding work because they permit direct crossing in contrast to the former necessity of using a male (non fruiting) vine as one parent. These varieties are of a large clustered type as they are the result of perfecting the large bloom cluster of the male instead of the small bloom cluster of the female variety.

The *Muscadine Grape Utilization Investigations* of the Department have been an important phase of our activity during the last five years. The desirability of a greater and more varied utilization of our Muscadines was brought home to me in connection with the harvest of fruit from seedling vines in the Experiment Vineyard. While there was a ready sale for the Scuppernong variety we did not know what to do with the quantity of small, black berried, relatively acid fruit. It seems desirable to find some profitable means of utilizing it and investigations were inaugurated. As a result of the in-



vestigations of 1915, Farmers' Bulletin No 759 was issued by the Department describing a method for making a syrup of good quality. Suggestions were made relative to the production of this syrup for home use where a supply of surplus Muscadine grapes was available. In the next year our investigations were confined to a study of methods for preparing a large variety of home products. We reached the conclusion that it was possible to utilize the Muscadine grapes which were available on most southern farms (often the only fruit at hand), in the preparation of a large collection of good products for the home. It was evident that these grape products were of excellent quality, easily made, and relatively cheap. The directions for making them were published in Farmers' Bulletins 859, 1033 and 1075. Certain of the products offered such promise as to leave no doubt of their commercial possibilities. The more recent work of the Department has been in the line of perfecting and standardizing methods of production and making a commercial demonstration which, although conducted on a home and farm basis, has, nevertheless, given results which large commercial interests will at least recognize as suggestive of possible commercial application.

The Home Demonstration Organization was the first agency to recognize the possibilities in Muscadine grape utilization and make use of the Department results. It is not too much to say that southern horticulturists are indebted to these women and to the canning club girls for having played an important roll in pioneering and laying the foundation for

horticultural and commercial developments.

It would have been useless to hope for commercial progress had not the women of the South recognized the new products as meritorious. We first presented the knowledge that excellent home products could be easily and cheaply made from Muscadine grapes, to the southern women and advocated the use of surplus grapes in the homes in contrast to letting them go to waste. The women of the South put up the new products in quantity for home use and were enthusiastic as to their value, even insisting on premiums being offered for them at State and county fairs. In war days, moreover, they made these products to the greatest extent as a means of releasing other food supplies for use over seas, and as a sugar-saving device. The next step in the program was the planting in home, perennial gardens of the particular varieties the Department has recommended.

I leave it to Miss Partridge to inform you of the regular four-year grape course formulated for the canning club girls of Florida. Using the state of Mississippi as an example, I can state that I have authentic record of the planting of over 10,000 Muscadine grape vines of the Thomas variety by canning club girls and women in that state last year. The next step in the program was the encouraging of girls and women in the clubs to prepare each fall a greater amount of the Muscadine products than they needed for their own use with a view to selling the surplus locally to their neighbors and townspeople. Quoting again from the records for Mississippi, I can state significantly that the women in that state



made and sold locally over 1,000 gallons of Muscadine grape juice at an average price of \$2.10 per gallon. What can this mean for the homes of the South other than profitable, refined employment; self reliance; independence; higher education secured with funds from personal effort.

The final and logical step: the effort to standardize the club girls' products and thus enable them to reach the larger commercial market is now under way. It is believed that certain girls and women, advanced in club work, are ready to confront the commercial world as responsible business agents. Why should they not establish their own horticultural plantations and vineyards? Why not establish their commercial kitchens and capitalize the knowledge of preparing high quality fruit and vegetable products? The Department is ready to help them. During the past year the Department has worked out the standards for their Muscadine grape products. In co-operation with them at the Muscadine Experiment Vineyard, Willard, N. C., we have produced on a home basis standard Muscadine products and through the co-operation of the Atlantic Coast Line, Seaboard Air Line, and Southern Railways, introduced these into the dining car trade where they have ready sale. The quality of Muscadine products, already recognized by the women of the South, has now received the approval of the general public. I have brought with me a small exhibit of these products to illustrate the kind being sold under the Standard 4-H Brand.

While the Home Demonstration workers are enthusiastic and determined to reap the full benefit of their early efforts,

they, of course, realize their limitations in the greater commercial field. They realize that if the commercial Muscadine grape growing and Utilization possibilities are fully developed, it will be through the enterprise of southern horticulturists and business agencies.

The women of the South, I feel sure, will be satisfied with the knowledge that they have played an important role in the general co-operative development. I accordingly wish to call to your attention, as horticulturists of Florida, certain matters which should cause you to consider the advisability of pursuing Muscadine grape work; particularly in those parts of Florida outside of the citrus area.

Considering first the outlets for fruit produced and then the production side, I would call your attention again to the exhibit before you today as evidence of what may be practically done. While our last year's work is not yet finished so that figures are available, I may state that the public has consumed as much as 100 dozens of containers of Muscadine grape jelly on the dining cars of one railroad in one month. There are at least two large companies today manufacturing beverages requiring the use of Muscadine grapes. During the past year, I am told, that at one locality only in North Carolina one of these companies placed into casks 195 thousand gallons of juice for beverage manufacture, pressed from Muscadine grapes. The other company handled 400,000 pounds of Muscadine grapes in their presses. The production of genuine unfermented Muscadine grape juice from the Thomas and other high quality varieties of Muscadine grapes is a particularly promising field. The Depart-

ment has demonstrated that properly grown, carefully picked, graded, and packed fruit can be profitably shipped to southern city markets in small containers, such as the two-quart Climax grape basket. A market is also developing in cities and towns for bushel lots of Muscadine grapes suitable for home culinary preparation. The best varieties always bring good prices on Southern markets. The Department's records show that in Richmond, Virginia, Atlanta, Georgia, and Central Florida nicely packed Thomas, Scuppernong, and James grapes sold for \$3.50 per forty-pound crate. The vineyardists received \$130 per ton for Scuppernong and \$120 per ton for dark colored varieties in bulk. Ten years ago the very poorest grade of Scuppernong grapes—fruit jarred from the vine and dumped into barrels—sold for as much as \$35.00 per ton to wineries. Yields are dependent on the variety and the season, but the better varieties should average three to five tons per acre. In comparison with these data, statistics show the average grape yield in New York State to have been approximately two tons per acre and the average price \$35.00 per ton. In California the average yield is 3.8 tons per acre and the average price \$6.00 to \$75.00 per ton, depending upon the season and purpose for which sold. The Muscadine grape requires no spraying for serious disease or insect enemies.

Because of the long and late blooming season, Muscadine grapes are one of the most regular annual croppers of all our fruits. In some other states of the Muscadine territory, vineyards are being de-

veloped. In fact the call for vines by prospective planters during the winter just past, has been so great that toward the end of the season there was not a single Thomas or Scuppernong vine to be had at any price.

In light of these statements, therefore, I suggest to you as Florida horticulturists the consideration of Muscadine grape growing as a sectional industry in a program of diversified farming or horticulture and as one means of making useful part of your vast area of idle land.

Mr. Hume: Does anybody want to ask Mr. Dearing any questions? This is a very important paper, and if we let it go until after the next paper, which is also very important, we may miss the opportunity of getting some points and light on the subject that we may get now.

Mr. Dade: Mr. Chairman, I would like to ask if these can be grafted on to the native Scuppernong.

Mr. Dearing: The Muscadine grape is your native grape, the Scuppernong is a variety of the Muscadine. We have the Thomas, the James, the Flowers and the Mish. Among these varieties we have every color from almost a green into a purplish brown, then into pinks, reds, blacks and jet blacks. Certain varieties like Thomas are superior for all culinary purposes and the grape juice we have there is from the Thomas variety; that is the one we are particularly interested in calling to your attention; and the Thomas grape is a reliable fruit. That variety is one that behaves well for the horticulturist and one that behaves well for the home specialist who is making these products.



Mr. Dade: The one I spoke of is a very small berry that grows through the woods.

Mr. Deering: You may have in mind one species, native here in Florida, a small berry with slick small leaves and in rather large clusters. The other species, the *Rotundifolia*, of which the *Scuppernong* and *Thomas* are varieties, is native north of North Carolina and Georgia. The real *Muscadine* is native in certain parts of the State, but the *Munsoniana* is the southern off-spring of the north.

Mr. Dade: Do you think they can be grafted?

Mr. Dearing: As to grafting the *Muscadine*, will say it has the hardest wood of any species of native grape. For that reason it is very difficult to graft it. It is possible to make a graft but it is not possible as a commercial proposition.

Mr. Dade: How is it propagated? Do you propagate it from cuttings?

Mr. Dearing: Yes, it is propagated from cuttings or from layers. We are working on that now, for this reason; you get a much better plant, much more symmetrical plant and it will be possible to propagate in a way to keep up with the demand.

Question: Do you mind giving us the method of propagating by cuttings?

Mr. Dearing: If you take your cuttings in the fall, in November, when the vines are first dormant, put these cuttings in a dirt mound. Hold them dormant until far along into January or February. This will be better than to plant them out at once. The reason is that you want to hold them back until you can get growing conditions. When you plant them out

under those conditions the root will form before the top exhausts the strength in the cutting itself. If you succeed, you get a good plant, but if the shoots start and use up the strength in the cutting before the roots form, that particular cutting will die. Your aim is to get roots to form before the bud comes out and uses up the strength in the cutting. That means that long cuttings are better than short cuttings. They should be planted on the slant because they grow better than when planted perpendicularly. On the other hand if the surface soil dries to a great depth then you want those plants absolutely perpendicular.

Question: How many joints should you use in cuttings or do you split it up with a knife?

Mr. Dearing: We don't select any particular number of buds because the buds are close together. We use the wood of the previous season's growth and then cut them about sixteen inches long. It is perfectly possible if you have the facilities of greenhouse benches, to grow short cuttings of only two or three buds, but that is a more expensive method than the field method. I believe that for home use it would be well to make your own cuttings. I think you will find it more successful to let the people who know the business and have the facilities to produce those plants to do the work, and you purchase them at a nominal price. They can do it at a time when they are produced in quantity, just as we propagate from the apple, orange and other fruit. Normally we have a commercial nursery established for that phase of the work.

Mr. ———: You speak of shipping the fruit. Now the *Thomas* cannot stand



shipping. When you pick the Thomas the skin is broken; will they stand shipping?

Mr. Dearing: The Thomas will stand shipping better than the Scuppernong variety. When the berries fall off, the skin does not bruise and the juice get outside, like it does with the Scuppernong variety. If you put it in small containers there is not enough pressure there to break the berries. Because of its excellent quality, although it comes in a shelled condition, it draws a good price. People are ready to pay for that variety when they know it. Now we have other varieties of Muscadine grapes that will hold on to the stem and we are going to expect more development with those varieties than with the Thomas. We are hoping to be able to cross between the Thomas, which has fruit quality and breeding adherence, and others which have good appearance, and get an intermediate form which will be a still better grape.

But that is another phase which will come in our breeding work which I will not cover tonight, and which is really our most fundamental work. That is the Department's greatest contribution, the long-time problem of plant breeding. Our great accomplishment today in that field is the production of a perfect flower, a self-fertile type of grape. We have a thousand different types now; there was not one known ten years ago. We succeeded in perfecting a rudimentary cluster of the male type, making a perfect self-fertile cluster of the larger male form and in that way we have made a good beginning.

Mr. McQuarrie: I would like to ask Mr. Dearing in regard to the possibility of this industry in the South. I notice he mentioned north and west Florida; how would it do in the southern part?

Mr. Dearing: In the southern part of the State the Muscadine can be grown. I certainly advise that you plant it for home use. I do not think it advisable to develop it there as a commercial industry, as you have with your citrus fruit. In other words, it is too far south for it. It grows well in central Florida. The vineyard where we started our breeding work was at New Smyrna and we went there for our first breeding work because we found the largest collection of varieties there that we found anywhere in the South. The vineyard we used is now out of existence. It has been turned over to citrus groves.

Mr. Stewart: The exhibit is in the room to the right as you go out, and it is worth while seeing. We had hoped tonight to give you a taste of the Muscadine grapejuice, perhaps we could arrange that tomorrow and it is far superior to the grapejuice that is now on the market. It has a flavor of its own and it belongs to us, in the southeast.

The next paper will be delivered by Miss S. W. Partridge. She needs no introduction to any of us. In my work over the State I have come in very close contact with her work, and I want to say that she can inject more enthusiasm into a bunch of girls in their canning clubs than anybody I ever saw, and I know she is going to put some enthusiasm into you people tonight in explaining the work that her girls have done in covering by-products of fruit other than citrus. That is the topic she has taken, but she is also going to touch on citrus by-products. These beautiful jams have all been made by canning club girls under the direction of Miss Partridge and her assistants. Miss Partridge.

# By-Products of Florida Fruits Other Than Citrus

**Sarah W. Partridge, State Home Demonstration Agent, Tallahassee, Florida.**

The food propaganda of the world war so closely link the two words production and conservation that to speak one is to recall the other. It were well if their practice were as closely linked. The first method, and frequently the only one that the agriculturist seeks to practise for the conservation of the fruit of his toil is successful marketing. Certainly this is the most important one. But not infrequently in the culls discarded at the packing house lie potential values which if developed, would affect materially the figures in the profit and loss columns of the grower.

Of such importance is the citrus by-products industry that it has been assigned a place all its own on the evening's program. But "Lest we forget," in the face of this big industry, that there are other rich and varied sources for fruit products in Florida, the third topic assigned is by-products of Florida fruits other than citrus. To name those fruits "other than citrus," is like reading the report of the good spies of Israel who when sent out by Moses to spy out the promised land, brought back with them all manner of fruits and reported that, though there were giants there, it was a good land in which to live. "A land that flowed with milk and honey."

To name our fruits other than citrus suggests that Florida, too, with its great

variety of fruits, easily produced, is a good land in which to live. We have plums, peaches, pears, loquats, melons, mayhaws, mulberries, mangoes, guavas, persimmons, pineapples, papayas, carissa, crabapples, cherries, strawberries, blueberries, blackberries, figs, pomegranates and grapes. Such an array silences the suggestion sometimes made that there are so few fruits in Florida that may be preserved. To fetch these from the orchard or grove, is to challenge the skill of that modern alchemist, the housewife, whose manipulations enmesh in her products the delicacies of the rare fruit flavors, and break the rays of the sunlight into their prismatic colors to sparkle in her jellies, preserves and marmalades.

If in any section of this State we have not many fruits to preserve, it is because the giant of indifference has not been overcome, for while eight of the twenty-one varieties named are found growing in an uncultivated state in various sections of Florida, all are better for special planting and a bit of care. If an additional stimulus to planting fruit is needed other than the fact that it pleases the eye and palate, its value in the diet should prove that stimulus.

Fruit should not be considered as a luxurious accessory to the diet, but recognized as belonging to a class of foods containing elements essential to proper



nutrition. Its use would add to the delight and wholesomeness of the diet whether served in a fresh state or preserved. When home grown its consumption reduces the high cost of living. The preservation of a number of varieties could be developed as commercial enterprises.

To help supply this need for fruit for home consumption, we have undertaken the development of small home orchards as one of the projects for girls and women of home demonstration clubs. These plantings are small, frequently not more than ten or twenty trees. Recent reports from our agents, however, show plantings under their supervision in practically every county in which we work. The agent in Madison has the greatest number to her credit, showing 1810 trees. One of her club girls is developing a small orchard that now contains nearly 100 fruit trees. The planting of Thomas grapes has been stressed and one hundred club members have made such plantings, but the plantings in the home orchard have not been confined to these.

The products that can be made from Florida fruits other than citrus are more numerous than are those fruits themselves, as each may be preserved in a number of ways.

The following are among the products most frequently found in the thrifty housewife's pantry: jellies, jams, butters, pastes, preserves, marmalades, sweet pickles, mincemeat, conserves, catsups, confections, flavorings, fruit juices, vinegars and were it prior to the good days of prohibition we might add wines.

In selecting fruit for canning or preserving, it should be remembered that the

best quality of fruit gives the best finished product. Fruit is at its best when ripe and well flavored. Culls are frequently used. This does not mean fruit in a decaying state, but misshapen, undersized, or otherwise disqualified for shipment. Should the fruit to be used show signs of decay, every part affected should be cut out and discarded. Fruit in such condition gives a more satisfactory product when made into fruit butter, or jam than when preserved or canned.

A preserved fruit is one which has been cooked in syrup until clear, tender and transparent. It should keep its form and plumpness, being neither tough nor soft. When finished the cells of the fruit should be filled with the syrup used.

Of the small fruits named best adapted to preserving without cutting into sections, are figs, berries, plums and crab-apples.

The uncooked fruit should never be dropped into a dense syrup for the juice of the fruit will be drawn out so rapidly by the heavy liquid that the fruit will shrink, and the contracting pores make a toughened surface which the outer coating of heavy syrup will find difficult to penetrate.

Most preserves should be started in a syrup testing 30 degrees to 40 degrees Brix. The exception to this is in the case of such juicy fruits as berries. These contain a sufficiently large per cent of water to dilute the sugar syrup and make a light-weight syrup. Preserves are usually finished in a syrup testing 45 degrees Brix., to 55 degrees Brix.; 105½ C, to 106½ C.; or 222 degrees to 224 degrees F.



Rapid cooking gives a product light in color. The fruit should be covered with syrup during the process, as exposed surfaces toughen and shrivel. Should the syrup become dense too rapidly it should be reduced by the addition of water. Cooking should be continued until a sufficient amount of syrup has penetrated to give a plump, transparent product.

If the vessel in which preserves are cooked is covered just before removal from the flame, it removes the weight of the air and the fruit quickly fills with syrup. Allowed to stand under cover for forty-five minutes or until sufficiently cool to retain the syrup, then packed in sterilized jars, the fruit remains plump, and will not float. A second method of plumping is to allow the fruit to lie in shallow trays covered with syrup for twelve hours, then pack, process for fifteen minutes and seal.

Fruits such as peaches, pears, guavas, mangoes, pineapples and melon rind that are usually cut in sections for convenience are preserved as the small fruits are. Any surplus syrup should be strained and bottled to be used in fruit punches.

Fruits suitable for preserving may be candied. In candying fruits they are prepared as for preserving and the cooking is usually done on the installment plan.

The process is slow and tedious. A short period of cooking, ten or fifteen minutes each day is given, and the fruit allowed to stand over night to absorb the syrup. The process is repeated until all of the water is drawn out and replaced by the syrup. The fruit slowly plumps. When bright and transparent it is lifted from the syrup and dried in the sun.

Some fruits prepared for immediate use are candied through uninterrupted cooking until the candied stage has been reached.

The following paragraph from Bulletin 18, Florida State College for Women, in regard to the selection of fruit for jelly making is of interest: "An analysis of jelly shows it to be composed of pectin, acid, sugar, ash and the fruit flavor extracted from the fruit used in the making of the jelly. The ideal fruits for jelly making are those which contain both acid and pectin. Sometimes fruits rich in pectin do not contain acid and will not make jelly unless acid is added. For instance, some varieties of guavas are rich in pectin, but need an addition of acid to make it possible to obtain a good jelly, while other varieties contain both pectin and acid in sufficient amounts. Jelly may be made from the juice extracted from such fruits by the addition of sugar and a proper concentration of the expressed juice by boiling. Fruit which is sound, and not over-ripe, is most satisfactory for making jelly. It should be used as soon after picking as possible, for it deteriorates in flavor upon standing, and loses some of its jellying power. Some fruits are richer in pectin when under-ripe. In making jelly from such fruits an addition of a small portion of this under-ripe fruit to the ripe will often furnish the necessary acid and pectin. The finest fruit flavor, however, is found in the ripe fruit. Where the ripe and under-ripe fruit is combined, the proportion should be such that the flavor is not affected by the under-ripe fruit used."

Among the Florida fruits possessing acid and pectin in sufficient quantity for

jelly making are the loquat, plum, some varieties of guavas, roselle, crabapples, grapes, carissa and mulberries when under-ripe.

A valuable aid in determining when a juice contains a sufficient amount of pectin is the alcohol pectin test. Boil together fruit and water. Strain a portion of the extraction. To one teaspoon of the extraction add a teaspoon of alcohol (95 per cent grain preferred), mix by gently shaking, then pour slowly from the glass. If the precipitated pectin is in a solid clot, resembling the white of a freshly laid egg it is safe to add a volume of sugar to each volume of juice taken in making jelly. If the clot is broken the amount of sugar should be decreased. If no pectin precipitate occurs, or if it is very light, pectin must be supplied before jelly can be made. The white part of the orange peel and the pulp of the citron melon are each rich in pectin and are frequently used as a source of supply from which pectin may be extracted to supply the deficiency in other fruits. (Among the Florida fruits to which pectin is frequently added for jelly making are strawberries and pineapple.) An excess of pectin or over cooking will produce tough jelly. An excess of sugar or under cooking will produce a soft jelly that will have a tendency to flow.

There are a few Florida fruits that should be better known for jelly making. The mayhaw found growing wild on the edge of the lakes and ponds of the northern section of the State yields a tart jelly, red in color, and with a most delicious flavor all its own.

The loquat which yields a light, delicately tinted jelly suggestive of apple.

The mulberry which when taken just as it is turning dark, will yield a jelly that will satisfy the taste of those who sigh for the currants they left behind them.

The roselle, or, as it may well be called, the Florida cranberry, which yields a jelly that closely resembles cranberry in texture, flavor and color. The chemical analysis of the cranberry and roselle shows roselle to be very similar in composition to the cranberry, the most important difference being that cranberry contains benzoic acid and roselle does not. Since this acid is not desirable in food, that it lacks it does not detract from the value of the roselle for jelly making.

The temperature at which a jelly is finished varies both with the variety of fruit and with the amount of sugar used. As the proportion of sugar is increased to any given juice, so the temperature to which the jelly must be cooked will increase. The point at which jelly from citrus fruits, apples, and roselle is usually reached is at or near 106 degrees C.; guava jelly is usually obtained at or near 108 degrees C.

Marmalade making involves the same principles as does jelly making. It is a jelly with portions of the fruit distributed through it. This jelly-like consistency distinguishes marmalade from butters, sauces and jams. Fruits suitable for jelly making are usually suitable for marmalade making. These fruits also may be used in the making of paste, cheese or fruit butter. The tough quality noted in jelly caused by too small a proportion of sugar is developed in the paste by using less sugar in proportion to the pulp than is used in jelly making, and cooking to a higher temperature. Varia-



tions in paste making may be obtained by heating the mixture and incorporating air as it is cooling, or by the addition of nuts or salted marshmallows.

So rich in sugar is our wild persimmon that the pulp may be rubbed through a sieve, spread in thin layers on a large platter and dried in the oven. This may be built up from day to day until of desired thickness, then packed away. This can be minced and used in cakes as a substitute for raisins.

Butters may be made from most of the fruits named. Pears, peaches, plums, guavas and grapes are among the fruits that especially lend themselves to the making of butter. After an extraction of juice has been made from fruits for jelly making, the remainder of the pulp may be rubbed through a sieve and with a small addition of sugar, or without sugar this pulp can be cooked to a good butter.

The home pantry is incomplete without the addition of the sweet pickle. When made with the amount of sugar usually allowed for preserves and the spices of the Orient, and only enough vinegar to cut the sweet, there are few products more tempting. Whole peaches, pears, plums or figs stuck with cloves and pickled are delicious indeed.

In discussing by-products of Florida fruits, one cannot omit the vinegars. The process of making is a simple one. With her wealth of fruit, Florida should strike vinegar from the list of articles imported. Any fruit or vegetable juice containing enough sugar can be used for this purpose. Blackberries, figs, peaches, watermelons (after the juice has been concentrated) cane syrup are among the sources other than citrus fruits from

which vinegar may be made. The fruit should be fully ripe but not decayed. The fruit should be crushed, and put in a clean vessel; a fresh cake of yeast should be dissolved in a cup of juice and added to each five gallons of juice, as a starter. Cover the vessel with a cloth to keep insects away and keep it as nearly as practical at a temperature of 80 or 90 degrees F. Fermentation will usually be completed in three to four days as indicated by the cessation of bubbling. Acetic acid fermentation should then set in. An addition of a gallon of good vinegar to each three gallons of juice will be found advantageous, or the addition of mother, found growing near the surface of vinegar. Do not use the mother from the bottom of the vessel as bacterial life is extinct in this. The vinegar or mother added prevents the development of objectionable bacteria. The vessel should be covered with a cloth and set in a dark place; do not exclude the air as the bacteria must have it in which to thrive. An inexpensive tester has been placed on the market. With this it is possible to follow the development of the acetic acid, and to determine when it has reached its maximum strength. The commercial product must contain  $4\frac{1}{2}$  per cent acetic acid. When acetic fermentation is complete the vinegar should be syphoned off and sealed tight.

In this day of extended thirst everyone is interested in the possible fruit juices.

Berry shrub may be made of strawberries, blackberries or dewberries. Select sound fruit, wash, measure and place in a stone jar, for every four quarts of berries use one quart of vinegar. Tie a cheese



cloth over the jar. Stir the contents daily. Let it stand for three days. Strain without squeezing, and to each pint of juice add a pound of sugar, boil five minutes and seal. Dilute when serving.

Of the citrus and Muscadine drinks you have heard, with these to alleviate thirst no one need suffer.

Second to citrus by-products, the guava products probably rank commercially, the jelly being the best known of these. In the past two years the luscious strawberries that remain on the vines when shipping season is over, and that used to be plowed under, have been put up as crushed fruit for use at soda fountains and cafes.

In one of our western counties this year blackberries and dewberries will be canned and put on the market by a local factory.

In Escambia county a fig orchard is being developed to furnish fruit for preserving purposes. An examination of the fig exhibit here will convince you of its possibilities. Members of the home demonstration club in Jefferson county found ready sale for 2,000 containers, and a demand for more.

Through home canning last year there was reported to the home demonstration office 1,310,000 containers filled with fruits and vegetables, a business easily representing a five-hundred-thousand-dollar proposition. The quality of the products is the best. The comparative cost of these products when put up in the home, with those purchased from the store is of much interest in this day, characterized by the high cost of living.

The sugar situation makes the outlook less bright for the canning season. Flor-

ida's possibilities as a sugar-producing State should enable us to solve this problem. Let Florida do it. She can.

Thanks to modern science, however, we are not dependent upon sugar for the preservation of fruits. During the wars of Napoleon, near the end of the 18th century, the French government offered a prize for the most practical method of preserving foods for sea service and army stores. Nicholas Appert of Paris, who for nearly fifty years was working in various lines of food preservation as a pickler, a preserver, a confectioner, a brewer, a distiller, a chef, won the award of 12,000 francs. His theory advanced was incorrect, but his method wrought out was correct. It was the present day method of preservation by sterilization.

And so, though the high price of sugar and its present scarcity on the market will prevent the housewife from finishing the product for her pantry shelves, juices may be sterilized and stored for later jelly making. Fruits handled in the same way may be put up for preserving or for the making into marmalades, butters, pastes or confections when sugar is more easily procured and less costly.

In the laboratory we have substituted in preserves with good results the malt syrup or americose supplied by the breweries. It gives a product not so sweet but well flavored. We find among the old recipes handed down by our grandmothers that during the war between the states when sugar, like many other articles, was difficult to obtain, that the juice of watermelons was filtered and boiled until a heavy syrup was obtained. This was used in making the choicest of preserves.

You have been told of the grape syrups that can be made without the addition of sugar. These will help.

In a recent party of which I was a member, a trip was made through a portion of our State. The agricultural representative of one of the European countries, an attache of the embassy traveled with us. We drove through Hillsboro and Polk counties and made the trip across Lake Okeechobee to the East Coast side. The groves were laden with blossoms and fruit, a promise with its fulfillment at

hand. The Everglade land, our visitor questioned, "The Ever Glad Land, did you say? Why do you call it so?" "Yes," I replied, "it is Florida, it is the Ever Glad land. And why should it not be, with its wealth of resources, its matchless soil and climate, and limitless possibilities, and with a people who are loyal and not afraid."

To us has been given this wealth, to be possessed and enjoyed. Let us make it, let us keep it, the Ever Glad land.

# Some Advantages of the Florida System of Nursery Inspection

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F. M. O'Byrne, Nursery Inspector, State Plant Board, Gainesville, Florida.

It is almost five years to the day since the State Plant Board, newly created, held its first meeting. A week later, at the Board's second meeting it was decided to reorganize the nursery inspection work. Previously the method of nursery inspection in Florida was the same as that in practically all of the other states. An inspector would examine the stock growing in the larger nurseries in the State once or twice a year. If it was apparently in good condition at that time the chief inspector would write out a certificate of inspection which was good for twelve months.

This system of inspection was highly unsatisfactory, for it was wrong in principle, doubly wrong. It was based on two false ideas. First, it presupposed that a competent inspector could look at a plant and tell definitely whether it was infested with some insect pest or disease. An inspector can't always tell. Second, it presupposed that a plant, if not infested, would not become infested during the next six or eight months while that certificate was valid.

This system of nursery inspection, which is still in vogue in most of the states, has been almost a complete failure from the start. Nursery inspection laws were passed to stop the spread of San

Jose scale. Did they stop it? No, they did not. San Jose scale has been shipped into every state in the Union on certified stock. It has undoubtedly been shipped under the certificate of every nursery inspection department in the United States. It is shipped on certified stock every day during the shipping season.

A host of pests have defied detection and have been spread on certified nursery stock in the last few years. San Jose scale, fire blight, cottony cushion scale, white pine blister rust, Oriental peach moth, woolly aphis, crown gall, chestnut blight, citrus canker, and so the list goes. Citrus canker entered Florida on certified stock from two different states and from Japan. It was passed, I believe, by Federal inspectors. It was shipped all over our State on certified stock; proof that inspection alone, no matter how rigid, is insufficient.

There are many reasons why inspection alone cannot give proper protection, the protection that the grower needs and deserves.

*First:* A nurseryman has a large sum invested in his business. If an inspector finds some pest in the nursery he can't condemn it all and require the absolute destruction of all host plants of that pest whether he actually finds them infested



or not. The nurseryman would fight such a ruling in the courts and would win (except in cases of the most dangerous pests.) The inspector must compromise by requiring the destruction of those plants actually found infested and by arranging for the fumigation, or for some other such precautionary treatment for the balance. It is impossible to cull out all the infested trees. Precautionary treatments are not perfect, so the pest spreads.

*Second:* An inspector is helpless when dealing with a new pest. (An inspector sees new and strange spots daily; ninety per cent of them are harmless.) He has no sixth sense to tell him instinctively when he encounters an unknown insect or disease whether it is going to be a serious one or not. He cannot slap on a blanket quarantine that will damage or ruin a nurseryman every time he sees a new spot. He must watch developments for awhile. If eventually he finds that the new trouble is a serious pest he knows to his chagrin that stock he has been certifying as clean has been carrying that pest.

*Third:* It is impossible for an inspector to detect any disease in its early incipency. There is always an incubation period after infection when the disease is just getting a start inside the plant. During that period it is impossible for any inspector to tell whether the plant examined has the disease or not. It is much like asking a doctor whether a child he examines will come down with the measles or mumps during the next year.

*Fourth:* Most nursery inspectors are not doing their work as thoroughly as

they would like to because of lack of funds.

*Fifth:* Occasionally nurserymen will conceal the presence of a pest from an inspector by having their own employes inspect before the inspector's coming, pulling tell-tale leaves, pruning tell-tale twigs and spraying with a white covering of Bordeaux with *plenty* of lime in it. This covers disease spots completely and makes accurate inspection impossible.

If taken in time a pest can be eradicated completely from a commonwealth for less than will be expended on it yearly, in control measures alone, if not eradicated. One of the most important points in any eradication campaign is to have promptly to hand a list of all points to which infected or suspected material has gone. This makes eradication possible at a reasonable figure.

To protect the horticultural and agricultural interests of the State, Florida has developed a new idea in nursery inspection. The Nursery Inspector is required to keep a record of all nursery stock legally set out in the State—from the nursery clear to the point where it is planted.

How is this accomplished, you may ask. Here is the plan. Those wishing to sell or move nursery stock are required to get their certificate tags from the Nursery Inspector, and must attach one tag to each container of stock moved. These tags are numbered consecutively (no two tags bear the same number), and the numbers issued to a nurseryman are recorded. He is required to show how each tag is used by furnishing the inspector with a record of his sales showing the number and kind of plants sold to each customer and the numbers of the certifi-

icate tags used on each shipment. Simple, isn't it. It is just like keeping your check stubs or like keeping carbon copies of your letters.

Suppose that an inspector finds that a new, but innocent looking spot, noticed in a nursery on one inspection, is spreading rapidly and it turns out to be a very dangerous pest. What then? If there are no records of shipments being kept, the inspector realizes that the fat is in the fire. Either the State must resign itself to the fighting of that pest year after year, or if it is to undertake eradication it will be necessary to send inspectors into every property in the State looking for plants from the diseased nursery. How expensive that is, and how slow. While the inspectors are working in some sections the disease will spread ahead of them in other sections. How different it is if records are available. The inspector has only to take out the folder containing the shipping records of the diseased nursery and he can figure out in a few hours the number of properties that are apt to be diseased, he knows their exact location. He can list them geographically by districts, send a separate inspector into each district and in a few weeks' time every property which has received trees from the diseased nursery has been visited. Such prompt action will prevent local spread ahead of the inspector's coming, such as occurred in the canker campaign at Ft. Myers, Largo, Wauchula and Groveland. The secret of success in eradication work is to "get there" quickly before the disease becomes thoroughly established in a community.

Someone has well said that the only man who never makes enemies is the man who never does anything. So likewise the only organization which meets no opposition is the one that never does anything. There has been some criticism of this new system of nursery inspection. It has come from three sources.

First: From nurseries in other States. These nurserymen object on the ground that it is a lot of trouble to make out the records that are required. It is quite troublesome, we admit it. But it is troublesome to keep a record of the checks you issue on stubs. It is troublesome to keep carbon copies of your letters. It is troublesome and more expensive to produce clean sanitary milk: But in every case it is worth all the trouble it costs, and then some, to do the work right. The main trouble, we believe, is that these out of State nurseries are afraid that this idea will spread if they don't fight it. Each State that adopts the requirements increases their trouble. They put notices into all of the catalogues they send to Florida points saying that due to the unreasonable requirements of the State Plant Board that they will not fill orders for nursery stock received from Florida. They state that they "have a clean bill of health" from their own State inspector who is the equal of any in the country and that Florida is the only State into which they are not permitted to ship. The whole letter is designed to prejudice the recipient deeply against the Florida requirements. In some cases they even urge that the recipient take the matter up and get a change in rules of officials. In other words, they would like to organize Florida citizens to turn out the pres-

ent officials and put some one in who would let their stock in without keeping a record. Their statements charging discrimination are not correct, because we will let any nursery ship into the State if it can show that its stock is in good condition and if it will give us records of its shipments. It is of interest to note that the firm most active in this campaign has brought a number of very serious pests into the country.

Second: There is opposition on the part of some Florida nurserymen. At first there was a great deal, but most of the nurseries that were afraid of the new requirements have changed their views and are now outspoken in their support. In one section of the State however an organized propaganda has been conducted by a few nurserymen ever since the reorganization of the department. Scaly bark occurs quite generally in that section, so that the regular scaly bark tags are issued to all local nurserymen. Advantage of this fact has been taken by the few disgruntled nurserymen there to prejudice the general public in that section against the work of the State Plant Board. They try to make it appear that that section of the State is being discriminated against and have by constant talk created quite a little adverse public sentiment in that particular portion of the State. It is clear that this is due to propaganda pure and simple, because nurserymen and growers in other scaly bark sections do not feel the same way though under identical restrictions. It is significant to note that one of the leaders of this opposition violated the nursery inspection requirements repeatedly before the reorganization and has

at least attempted to do it since, and that another one has violated the inspection law or rules repeatedly since the reorganization. As indicated, however, this opposition is purely local.

Third: Many good ladies, and others who are uninformed concerning the need for more careful regulation of nursery shipments are prejudiced against the new system of nursery inspection by letters and notices (propaganda) sent out by nurserymen of the North. A few minutes talk by one who understands the situation is enough to convince almost any of them.

However, the Florida system of nursery inspection is growing in favor at home and in other States. Some nurserymen, who at first thought it would be a burden, have learned to fit it in with their regular work and have discovered that it was not a great task and furnishes them a valuable check. For example we once wrote a nurseryman to account for tag such and such a number. While preparing an invoice for us it occurred to him that he possibly had failed to send one to his customer. He sent the invoice and made the collection, and it amounted to over fifty dollars.

After careful investigation both South Carolina and Mississippi have adopted the Florida regulations in total. They are as pleased with the way it works as are we in Florida. At a recent meeting of the Association of Cotton States Entomologists the Florida scheme of nursery inspection was unanimously endorsed. The prospects are bright for having the Florida system adopted throughout the South. After that we can expect its adoption by practically every State in the



Union, for it gives the planter the protection he should have and mere inspection alone will never do it. We are even winning converts among the nurserymen in other States as witness this statement by a Michigan nurseryman who very briefly sums up the situation as we see it as follows:

"It would be useless to deny that wherever two or more nurserymen are gathered together, and the subject of Florida requirements comes up, your requirements are very liberally damned from Hell to breakfast and back again.

However, the rules as laid down by your State must be caused by conditions with which you are confronted, and will be to the ultimate advantage of the grower. It seems to me that this should be the point toward which all of us should work—the greatest possible security for the man that plants the tree."

There is only one way that we can give the greatest possible security to "the man that plants the tree"—That is by keeping a record of the points at which certified stock is planted. Florida is doing it.

# Melanose of Citrus

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T. A. Brown, Ft. Myers, Fla.

I have been asked to prepare a short paper on the successful control of Melanose on citrus trees. It is well perhaps that the request was for a short paper, as I am quite thoroughly convinced that there is very little to be said which has not been fully covered in the bulletins issued from time to time by the very able men of our State and national governments who are working among us along these lines.

As the scientific side is best left to scientists, I will confine my remarks to the angle from which the growers must of necessity draw their conclusions. I may as well begin by saying that I know of no better method of control for this disease than the removal of all dead wood which has proven to be a breeding ground. Melanose as I understand is produced by a low form of plant life, or fungus, which first became noticeable as a serious enemy of the citrus tree directly following the big freeze of 1894-95, at which time its virulence became so evident that the U. S. Government sent two scientists named Webber and Swingle to investigate the trouble and if possible find a remedy. These men spent some time studying the disease and I believe found the cause and gave it the name it now bears. We might also say that they gave us the foundation for the work which has been continued up to this time. It

has since been proven that severe frost damage has invariably been followed by apparent increase in Melanose.

Later, scientists isolated the spores of the fungus, and compared them with those which caused stem-end rot, but as yet I am not sure that anyone can tell us just what the essential difference is; and as they do similar damage, they may perhaps be classed and treated as one and the same thing as far as practical working details are concerned. In the case of the stem end rot the trouble seems to start in the calyx of the fruit stem, generally on a heavily loaded and thereby weakened branch, often causing the fruit to drop soon after maturity; from then on the two diseases act very similarly, causing the twig to die then following back to the parent branch, and all the time acting as a hot bed of infection for any tender or weakened growth nearby. While stem end rot seems to do most of its damage by dropping the mature fruit which is often perfectly bright, Melanose begins with the first growth and works all through the growing season, making its most rapid strides while the trees are wet with dew or rain, at which time the spores of this fungus multiply in the form of minute hair-like runners, the cells of which are the active germs, and which are distributed by wind or rain, or any moving object with which

they come in contact. Whenever they lodge upon tender or weakened tissue they find a foothold and set to work. The disease does not seem to be very noticeable until the new growth begins to harden up; quite often the grower is not aware that his fruit is materially affected until his fruit begins to color, then to his intense surprise and sorrow it appears as though a strong acid has been showered on his fruit, causing irregular streaks or specks of rust which are so thoroughly imbedded in the rind that its removal would ruin the chances of getting the fruit to market in a sound condition. Upon investigation he will find that many of the twigs, especially water sprouts, are coated with the same brown rust which often extends to the leaves, and in the case of young trees, not infrequently causes the foliage to have the appearance of having been burned in spots.

I have been told, and from what I have seen, I can readily believe that Melanose is more prevalent this past season than for many years, and it seems that many people are justly alarmed at the situation confronting them. I know of no reason why a man should not be alarmed when he sees his trees showing more and more dead wood, and when in going over the market reports he sees that his fruit was about 75 per cent russets, and that they sold for perhaps fifty cents or more a box less than the brights sold for. Most of us who had rusty-grapefruit this year, know how much that extra half dollar means, yet I doubt if there is an average of one budded tree in fifty throughout the State which cannot

be pruned for fifty cents, even at the present high cost of labor.

This naturally brings up the labor question in which I am sure we are all vitally interested. Most of us remember that three years ago last winter we had a severe cold spell, which was of course followed by Melanose generally in proportion to the damage done by the cold. Labor was already scarce, and on top of that it became our duty to send many of the remaining men to fight a worse foe than Melanose; consequently many of us have not been able as yet to thoroughly clean the dead wood out of our groves. Until we do give our groves a thorough clean-up, pruning out and burning all dead wood, I am of the opinion that we will not get rid of this very troublesome disease. My experience has led me to think that the negro laborer commonly found in the orange groves of Florida is not as a rule competent to say when a tree is properly pruned. Therefore, we must take into consideration that if one has much pruning to do he must figure on a foreman of first-rate ability. Let me say that this foreman should be in perfect sympathy with the idea before him—wherever possible let the owner act as foreman—and that he only employ what men he can handle in such a way as to see every man's work at least once every hour. Perhaps twelve to sixteen men should be the maximum crew for one man in the average grove.

The writer has found that where the trees are of a relatively uniform size and condition, and where the men have had some training in pruning, the system of contracting the work of so much per tree



will work admirably. Let each man be taught that it is just as easy to cut off a branch or twig in the proper way as it is to do it improperly. Let him be fined or otherwise punished for leaving stubs, or for cutting wood that should not be removed. Teach him that to cut a twig once in the right place takes him just half as long as to cut it wrong and then have to recut. As the pruning is done let a careful man follow with paint brush and carbolineum or coal tar, to paint all wounds larger than a five cent piece. This will act as a disinfectant, preventing the disease from being carried from dead or infected wood to the clean tissue.

When a man gets in practice he should be able to prune from 6 to 10 bearing trees in 10 hours, even when the trees are in quite bad condition. Each man should be provided with a picking ladder, pruning saw, one large and one small pair of shears. The foreman should see that these tools are in good condition at all times. Our experience has taught us that any man who is a good picker will readily become a good pruner if properly instructed.

Of course, we all know that during the winter months is naturally the proper time to prune, and is by all means desirable. Most of our good pruners are picking fruit at that season. Therefore we find it advisable to do our pruning at any time of the year when the trees are not in full flush with new growth.

After a winter pruning, and just before the new growth appears, it seems advisable to give the trees a thorough spraying with one of the standard fungicides, such as lime and sulphur at a strength of one to thirty or one to forty. Any further spraying for the control of Melanose has not appeared to me as being practical. When all is said and done, I am thoroughly convinced that careful pruning out of all dead wood is the prime factor in the control of this disease. The man who prunes his grove clean at least once every year will soon be repaid, not only in dollars and cents, through the more vigorous and productive condition of his trees, but in the satisfaction of having his fruit go to market ready to compete with anything found there.

# Fumigation in Quarantine Work at Ports

Dr. J. H. Montgomery,

Quarantine Inspector, State Plant Board, Gainesville, Fla.

Most of you, I assume, were present at last year's meeting of the Society. At that meeting Mr. L. R. Warner, our inspector in charge at Key West, presented an able paper covering the work the State Plant Board is doing at the various ports of Florida. Mr. Warner in detail pointed out to you the many serious insect pests and plant diseases which are established in foreign countries, more particularly those contiguous to the State of Florida, the entry of which we have to guard against. It is the duty of the Quarantine Department of the State Plant Board to prevent the introduction of these serious pests. I assure you that although the Florida grower thinks he has a heavy burden to carry now in combating pests, this burden would become unbearable if it were not for the watchfulness of the port inspectors.

I do not propose to take up your time with a repetition of the material presented by Mr. Warner last year although if I did it would not be time wasted. Very briefly I want to present a resume of Mr. Warner's paper, call your attention to some of the more serious dangers which are being guarded against and the means being taken to protect the horticultural and agricultural industries of the State, and then dwell upon one particular phase of the protective work, namely: The fumigation of plants and plant products from foreign countries at Florida ports.

The State Plant Board has Assistant Quarantine Inspectors stationed at the following ports: Jacksonville, Tampa, Pensacola, Miami and Key West. These are the principal ports of entry. We also have a partial service at Palm Beach. This latter on account of the private yachts coming to this place during the winter season. All of the men stationed at the ports hold appointments from the Federal Horticultural Board, U. S. D. A., as collaborators and act as plant quarantine inspectors for the Federal Government. Salaries and all other expenses are borne by the State of Florida. Under the Federal Plant Quarantine Act of 1912, the application of the rules and regulations of the Federal Horticultural Board is imposed on the Customs service, plant inspectors acting in an advisory capacity. In practice, however, the Customs officials are very glad to have our men participate in the inspection of ships, cargo, baggage and passengers. Many of the rules of the Federal Horticultural Board and of the State Plant Board are similar. In some instances, though, Florida has in effect rules which are of State-wide application rather than nation-wide as in the case of Federal rules. As an illustration: The State Plant Board has a rule regarding importation of material which for any reason might introduce the black fly. The Federal Government does not have such a rule. And so

it is that through either State or Federal rules or through both the farmer and fruit grower of Florida is afforded protection.

In their dual capacity our men have, during the year ending April 30th, boarded 4,500 vessels arriving at Florida ports. These have been inspected from stem to stern. Passengers' cabins and crew's quarters have been carefully searched. Every place where contraband plant material might be secreted has been investigated. 325,000 parcels have been handled as being potential disease or insect pest carriers. Of this number more than 2,000 have been refused entry as being dangerous. It is a common occurrence for our men to intercept material infected or infested with some disease or insect which is not now known to be present in this country and which if introduced would occasion great losses.

From the very nature of the work in which they are engaged our men encounter many difficult and trying situations. I am glad to say that invariably they have been able to overcome the difficulties and to handle unpleasant situations without an undue amount of friction. They have been courteous but firm, decisive but never offensively so, accommodating but not lax. The successful performance of the many duties devolving upon our men calls for the employment of men of the very highest type. They must not only be men of more or less technical training but must be men who can impress the public with the fact that they know their business and intend to attend to it. Being men of this type they have been able to secure and hold the co-operation of Customs and trans-

portation officials and that of commercial shippers. Without this co-operation their work would be seriously hampered if not made worthless.

Some of the dangerous pests which we are trying to keep out of Florida are:

Mediterranean fruit fly, Mexican orange maggot, black fly, insects attacking sweet potatoes, sugar cane insects and diseases, West Indian fruit fly, in fact, any and all pests attacking our products. Perhaps the most serious of these, certainly the one to which we are most exposed, is the black fly, a close relative of our white fly. This fly is present in parts of Cuba, in the Bahamas, in Jamaica, Panama and no doubt in other West Indian islands and other Central American countries. It has put the Nassau fruit grower practically out of business as a commercial producer. In the parts of Cuba where the black fly has become firmly established there is now no hope that it will ever be eradicated. The very best that can be looked for is control and minimizing the loss. Not only does this fly occasion great loss but the number of plants and trees which are attacked is very large. Hardly a fruit tree grown in the peninsular section of Florida would be immune from attack if this pest were introduced.

When it was learned in June of 1916 that we were exposed to this danger the State Plant Board took prompt action to protect Florida's industry. A drastic regulation was put into effect which prohibited the introduction from black fly infested countries of any material which could possibly serve as a carrier of the pest. This quarantine was rigidly enforced even to the extent of refusing to



permit delivery in Florida of fruit shipments from dangerous places when such shipments included leaves, twigs and branches of trees. All of you know that during certain seasons of the year enormous shipments of mangoes, avocados, citrus fruit and other tropical and semi-tropical fruits are sent to Florida from Cuba. Thousands of packages arrive at Key West and Port Tampa. The examination of each of these packages was undertaken and was done. As many as sixteen Plant Board men have been engaged in this work at one time on the arrival of a P. & O. boat at Port Tampa. The amount of effort and the expense became so great that we were forced to the point of either excluding fruit shipments entirely, thus relieving us of the burden, or of evolving some other plan of making suspected fruit shipments safe. We could no longer carry the expense of inspecting, neither did we desire to shut off a food supply which arrived at a time when Florida was not herself producing that particular kind of product. There was, however, an alternative — fumigation. This alternative presented some mighty big problems for solution, some complex questions to be answered, and answered satisfactorily before we could seriously consider practicing fumigation as a substitute for inspection.

Among the problems presented for solution in connection with the use of fumigation were: practicability, cost, efficiency, kind of fumigant to be used, possible injury to material fumigated, whether or not fumigant might be absorbed and retained in quantities sufficient to injure consumer, nature of the

facilities required and the strength of the dosage to be used.

Once having determined to make other arrangements to handle the Cuban shipments we at once instituted investigations to determine the various influencing factors. This work was undertaken in co-operation with the investigators of the Federal Horticultural Board, U. S. D. A. Exhaustive experiments were made including chemical analyses of fruit subjected to fumigation both under field and laboratory conditions. Numerous samples of fruits, vegetables and plants were fumigated here in Florida under different conditions and with different fumigants at diverse strengths. These samples were examined by the experts of the Department of Agriculture, extensive laboratory research being necessary. Observations were likewise made by our own Florida investigators as to the physical, climatic and chemical conditions. Unfumigated fruits were sent to Washington where they were subjected to various kinds of fumigation, some of the material being fumigated in vacuum.

As the net result of all these protracted and complicated scientific investigations the conclusion was finally arrived at that fumigation with hydrocyanic acid gas at a strength not to exceed two ounces per 100 cubic feet was effective in destroying insects in different stages without injury to the material fumigated and without subjecting consumer to danger. These facts having been established we were now in position to consider the practical side of the problem. Could arrangements be made to fumigate? How about facilities and equipment? We had made up

our minds as to what facilities and equipment were desirable and necessary. We knew about what the size of the fumigation rooms should be to take care of the offerings. We had decided how they should be constructed and we had ascertained the approximate cost for labor and material for construction but we also knew that we did not have the funds available for construction and equipment and, further, the State Plant Board did not have a location for the necessary buildings and even if we had the money, there was some question as to the legality of expending State funds in the construction of more or less impermanent outfits on property not owned by the State. At this juncture the Plant Commissioner asked for and was granted a conference with the managing heads of the three transportation companies chiefly and most directly concerned. The conference was held and the whole perplexing situation was presented to the consideration of the transportation men. As has been the case in all instances where the State Plant Board has asked for help and co-operation from transportation people, assistance was forthcoming promptly. The Atlantic Coast Line Railroad agreed to supply space in the warehouse at Port Tampa for the fumigation room and the Florida East Coast Railroad undertook to do the same at Key West. The P. & O. Steamship Company generously agreed to construct and equip the necessary plants at these two places in accordance with plans and specifications to be supplied by the State Plant Board and under the general supervision of the Board's agents. Furthermore the Atlantic Coast Line and Florida

East Coast Railroads made arrangements for supplying tight refrigerator cars for fumigation purposes until such time as the fully equipped fumigation rooms would be available.

The understanding arrived at in the conference has been carried out except that the room at Port Tampa is not yet completed. It is expected that this room will be in shape for use in a very short time. The outfit at Key West has been in use for sometime past and with most satisfactory results to all concerned, shippers, receivers, transportation people and Plant Board inspectors.

During the period when the fumigating rooms were being prepared we found the use of the refrigerator cars suitable as an emergency measure. There were, of course, inconveniences and difficulties but in the absence of more satisfactory equipment we got along very nicely with the cars.

The floors, walls and ceiling of the fumigating rooms are constructed of two thicknesses of kiln-dried, knotless, two inch tongue-and-grooved flooring. The joints are heavily white leaded and driven home. Between each thickness heavy building paper was used. All angles are white leaded and reinforced with extra layer of paper held in place by quarter round. The walls, ceiling and floors are heavily painted inside and outside. The doors are of ample size, being double and specially constructed for refrigerator use. There is an outlet and flue with a large exhaust fan; also, inlets for fresh air. By means of the flue and exhaust fan with the fresh air inlet the room can be freed of gas in from ten to fifteen minutes. Provision was also made for insert-

ing the fumigating charge from outside the room. The room is electrically lighted and has a capacity for taking care of about two carloads (700 crates) of packed fruit. Hydrocyanic acid gas is the fumigant made use of, and the material fumigated is exposed to the gas for one hour. The whole time consumed in the operation is only about one and one-half hours.

From reports received from our inspectors who have been in charge of the fumigation work at both Port Tampa and Key West, we are convinced that this operation can be carried on with safety to both the fruit and the consumers. On only two occasions have our inspectors reported having observed any injury whatever to the fruit or vegetables fumigated. On both occasions there was a scalding or burning of the rind of the fruit. This was directly traceable to an accumulation of moisture on the fruit, this moisture being due to the fruit having to be moved for a short distance through the rain from the place of unloading to the car where the fumigation was being administered. In transit a certain amount of water gained entrance to one or two of the crates. By reason of the accumulation of moisture there was an excessive amount of the fumigant at the points where the water had lodged, thus causing burning. Under normal conditions no injury to any of the material fumigated has been reported. The receivers of fruit and vegetable shipments from Cuba are satisfied because deliveries can be made more promptly to them as

a result of the quick process of fumigation and the fruit is in better condition than it was formerly when it was necessary for us to open the packages and inspect the contents. Likewise the transportation interests are well pleased with the results of the fumigation work.

I would not have you understand from the foregoing that the work of the Quarantine Department of the State Plant Board is particularly directed against the black fly or along the lines of fumigation. Other projects are also being handled under the direction of the Quarantine Department. Sweet potato weevil eradication and the prevention of the spread of the sweet potato weevil, the efforts now being made to eradicate the recently introduced mosaic disease of sugar cane, the administration of the quarantine on cotton and cotton products to prevent the introduction of the pink bollworm of cotton, the precaution of illegal shipments into and in the State of nursery stock; all of these and other important matters are handled through the Quarantine Department. Especial stress has been laid in this paper upon black fly as an illustration more than anything else in order to lead up to the discussion of the subject of the paper, that is, fumigation work of the State Plant Board. If through this paper we have given those assembled here some slight idea of the protection that is being afforded to the fruit and vegetable growers of the State through the fumigation work at our ports of entry the purpose of the paper will have been accomplished.



# The Experiment Station

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**P. H. Rolfs, Director Florida Agricultural Experiment Station, Gainesville.**

It is an unusual privilege for anyone to have the honor of addressing the Florida State Horticultural Society, especially is this so at the present meeting. The Society is now a third of a century old. It has grown steadily in importance and its influence has been felt in all parts of the State. From the published proceedings it appears that the Horticultural Society started with a membership of eighteen at its meeting when the constitution and by-laws were adopted. Several members were added to this list as charter members when the charter was received for the Association. Twice have we been honored by a visit from the American Pomological Society. The membership of the Horticultural Society is now reaching upward toward a hundred-fold more than it was at the time of the adoption of the constitution. I might use the entire time allotted to me for this address in speaking of the good things the Horticultural Society has done and still not exhaust the subject. Among the very pleasant things of the Horticultural Society has been its privilege of having for its principal speakers some of the greatest horticulturists of the United States. These great horticulturists such as Bailey, McFarland, Waugh, Swingle, Webber and others have been of great inspiration to us.

Today I want to address you especially on the subject of our Experiment Sta-

tion. The Florida Experiment Station is the one organization in the State that has aided most largely in solving some of the most difficult and severe horticultural problems that have been before us.

## RESUME OF WORK DONE.

The Florida Agricultural Experiment Station was established in 1888. It is a coincidence that the Experiment Station was established the same year that the Horticultural Society was founded. Members of the staff of the Experiment Station have always had a leading part on the program of the Horticultural Society. Mr. J. N. Whitner and Mr. James P. DePass were both charter members of the Association. Professor Hume and myself have had part in the development of the Experiment Station as well as part in the development of the Horticultural Society.

During the thirty-three years of its existence the Experiment Station has published 32 annual reports, 155 bulletins as well as 320 press bulletins. In the number of publications we are 24 bulletins and 320 press bulletins ahead of the requirements of the law. Last year we published: 1 annual report, 108 pages, 4,000 copies, total pages 432,000; 5 bulletins, 260 pages, 83,000 copies, total pages 21,580,000; 40 press bulletins, 80 pages, total pages, 32,000. Total num-

ber of pages printed 22,044,000. Total pages distributed (80%) 17,635,200.

The most important horticultural publications during the last two years are bulletins on Melanose, diseases of truck crops, tomato diseases, diseases and insect pests of the pecan, insects of the citrus grove, some diseases of the fig, Florida citrus diseases, Florida truck and garden insects, and ten year fertilizer experiments. In addition to these there were published numerous press bulletins on similar and allied subjects. It should not be assumed for a moment that other lines of agricultural interests have not been represented in publications during this period. We are today, however, especially interested in the horticultural side of the institution.

#### WHAT IS THE EXPERIMENT STATION.

In 1862 Congress passed the Land Grant College Act. This Act gave to every State in the Union ninety thousand acres of public land for every representative in Congress. Owing to the disturbed conditions of the United States during the sixties Florida was not in a position to take advantage of this Act until 1872. The Florida Agricultural College was definitely established in 1883. In 1888 Congress passed an Act granting \$15,000 annually to each State having a Land Grant College. This money therefore, is appropriated directly to the Agricultural or Land Grant College. In 1906 a supplementary Act was passed, granting an additional fund which now amounts to \$15,000, known as the Adams Act.

It should be borne in mind that the Experiment Station is a division of the Agricultural College and that the Federal moneys are appropriated for use with these Land Grant Colleges.

The Hatch Act establishing the Experiment Stations is a somewhat lengthy law, a reading of which would not materially help us today. The fundamental thought underlying the law, however, is that this money is appropriated for the "acquiring and dissemination of the useful agricultural information." The United States Secretary of Agriculture is designated as the proper authority to review the work and ascertain whether the work conducted at the Experiment Station is in accordance with the law and whether the funds have been properly expended. The point I wish to call to your attention, however, is that the Experiment Station is an institution that has for its primary object the discovering of new and valuable agricultural truths, and then its work is only half done, since it is also entrusted with the work of publishing the same. I wish to make this point very clear since many people in the State of Florida assume that because of the popularity of the Experiment Station that it takes up the instruction of students at the Agricultural College and also takes up the instruction of people in the field. More or less instructional work in the field was winked at by the Secretary of Agriculture during the early years of the Experiment Stations. It was, therefore, not unusual for the salaries and traveling expenses to be paid to the members of the staff for holding Farmers' Institutes. However, more than twenty years ago it was ruled

that this was an improper use of the Experiment Station fund.

As early as in 1907 the State Legislature appropriated a small fund of \$5,000 a year for conducting Farmers' Institutes, only part of which became available. This enabled the director of the Experiment Station to pay the traveling expenses and salaries of the Experiment Station staff while they were on duty as lecturers at Farmers' Institutes. This fund was not continued by the Legislature after 1919.

In 1909 the Experiment Station moved into the present commodious building which was constructed and equipped at an expense of \$50,000. The Legislature of 1913 continued the appropriation for the Farmers' Institutes and allowed us approximately \$1,000 a year for printing bulletins from the Experiment Station and Extension Division. This helped materially in that it permitted us to publish bulletins on general information that could not be legally published from the Federal funds. The Legislature in 1915 appropriated \$2,000 annually for the biennium for continuance of the experiments begun; \$2,500 for repairing and upkeep of buildings, and \$3,750 for a printing fund. The funds available by the action of the Legislature of 1917 made \$14,500 available for continuing the experiments, printing, and for carrying on field institutes. The Legislature for 1919 appropriated a total amount of \$10,000, cutting out the item for printing, also for holding institutes and limiting the fund for continuance of experiments begun, thus giving us \$5,000 annually as against \$14,500 for the year 1918.

From the biennial report of the Board of Control which is a document published

for the information of the Legislature, a recommendation to the Legislature for the biennium ending June 30, 1918, the following recommendations by the Director will be found on page 144. Enlargement and continuance of field experiments in fertilizers and soils \$9,600; for enlargement and extension of the work on entomology \$11,200; for analytic and laboratory work on fertilizers and soils \$3,200; introduction and dissemination of new and useful plants \$4,500; for continuance of experiments begun; repair of buildings; upkeep of farm \$8,000; reprinting bulletins and reports out of print \$8,000; making a total of \$46,250, one-half of which would become available each year, or an annual appropriation of \$23,125 in which the horticulturists of the State were principally interested. As I have said above, in the place of receiving this amount or an approximate of it, \$5,000 annually was received. This was a great disappointment, but we are not going to stop here. We expect to go back to the next Legislature and ask for still greater increase, and if the horticulturists and livestock men of the State will get behind this movement, as I believe they will, we can put it across.

#### THE FIFTY CENT DOLLAR.

During the entire period of the war every man and woman with the Experiment Station staff with possibly one exception, stood nobly and manfully by your institution. Many importunities came from commercial institutions as well as from other institutions to leave the work in the State of Florida and take



up work elsewhere with larger and more remunerative salaries. In addition to these importunities the price for necessities of life began to continue to mount by leaps and bounds so that by the time the last Legislature adjourned a dollar would actually buy only half as much as it would have bought three years before.

In addition to the vicissitudes that I have named above, first and foremost is that of increased cost of living and the higher prices that are being paid for services, the State appropriation was reduced from \$14,500 to \$5,000 annually, and when you remember that the basic funds for the Experiment Station was not increased you will readily see that there must be a contraction in the amount of work than can be done by more than 50 per cent. Absolutely no one in the State of Florida seemed to be prepared to accept the actual situation that was being faced. Everyone written to and everyone spoken to sympathized with the situation, but seemed to think that the same amount of work and good services would be delivered on the fifty cent dollar that was given and delivered on the hundred cent dollar. It sometimes takes a rude shock to awaken one to the necessities of the particular situation.

Ladies and gentlemen of the Horticultural Society, you have before you a plain unvarnished statement of the situation. The members of the Experiment Station staff have been patriotic in standing by you and your institution through the most critical and trying times. They have done the very best that could be done under the circumstances. I doubt if any other set of men and women would have done as well under the same situation and

under the same conditions.

The Agricultural Experiment Station must in a general way be fairly representative of the agriculture of the State. In other words, all the different lines of agriculture need in a general way to receive their proportionate attention. No one line can be fully served even if the total funds should be four times what they have been in the past. The demands upon the Experiment Station have been most exacting and persistent and constant. People during war times had become more and more dependent upon the exact information that could be given out from this institution. They have not lost their confidence in the institution by any means, and I believe that the people of the State as a whole will support and see that the proper recognition and support is forthcoming from the next Legislature.

#### WORK NEEDING TO BE DONE

In the horticultural line there are many important and large problems that need to be taken up and investigated. One dollar invested now in investigations and publications will save the State anywhere from \$100 to \$1,000 ten years hence. The Experiment Station as an educational institution must lay the foundation and ground work for this better knowledge. The results of the work cannot be computed in dollars and cents but are really immeasurable. Let us take one small problem as an illustration. Suppose that it would have been possible for a well trained plant pathologist to have been put in the field last July who would make careful investigation and thorough study of the difficulties and losses sustained by

the fruit and truck going bad in transit. At first sight this is a simple question, merely one of temperature of the cars. However, this is overlooking the very important fact that has been repeatedly placed before us that it is a deeper and more complex problem. We are needing now and without delay a well trained scientist who is at once a good plant pathologist and also a man who understands the difficulties encountered in the transportation problems. You would have saved this year to the horticultural people of the State one hundred times, possibly one thousand times his annual salary in loss of fruit and truck in transit.

Then there are these large field problems that have been only slightly touched. I am referring to the fertilizer and soils problem. Ten years ago when we began our investigations of this problem in the field, people were much more positive that they knew what brand of fertilizer to use, how to use it and how to apply it as well as what the results would be than they do today. Some very important and most valuable lessons have been learned from this experimental work which was established and carried on for a period of ten years. The data is so complete and well arranged that those interested have found bulletin 154 of inestimable value. I know because I have heard both by letter and by word of mouth that this is the case.

The insects of the citrus groves are present with us always. Much good has been done by limiting the spread and introduction of these by the Plant Commissioner and much more must still be done in handling this question in the future. There are large series of insects

which have been only imperfectly investigated. Then there are whole lines of diseases in the citrus groves that are only very imperfectly known, but to continue the work that has been started and to work out the many problems that our entomologist says needs to be done, requires both men and money.

The State is losing many thousands of dollars and hundreds of valuable citizens for the lack of exact knowledge on such crops as pineapples, peaches and persimmons. The men who are especially trained for scientific work and who are doing the work cannot be expected to raise the money for the projects. We, the Horticultural Society, must get back of them.

I am not here trying to outline the problems for experimental work but simply calling attention to some that need immediate and thorough attention.

The small fund placed at our disposal by the Legislature for publishing popular bulletins in the last four years has probably given the largest returns to the horticultural people of the State that they have received in years, but we are short, woefully short in scores of lines of endeavor. Where can you turn for a reasonably good bulletin on pineapples, on persimmons, on pears, or a reasonably comprehensive bulletin on peaches. A large amount of the most valuable pineapple information is available, but for the lack of time to rewrite and money to print this cannot now be given to the State.

I have given you a somewhat general resume of the situation from the horticultural standpoint. This is the one line of agriculture for which we are assembled. When we come to consider the livestock

interests of the State, we will find that the difficulties are even greater, due to the livestock industry having come up more recently. When we take the general farming interests or what we might call general cropping interests, we have the same outstanding need for investigation and publication.

#### CONCLUSION.

Ladies and gentlemen, I have placed this whole situation before you. The Experiment Station is yours. As your director I am going to do all I can to make the institution bigger and more serviceable, but it is up to you directors and shareholders in this corporation, for that is what you are, to provide the finances. Individually, people have responded splendidly. I am now calling for help collectively, unanimously, and from the Horticultural Society as a whole. You are more vitally interested in it than anyone else, and with a united and well directed effort the splendid work already accomplished by the institution will be continued. Remember that the Experiment Station will continue to exist long after we have passed to our reward. However, whether this institution will be of service depends upon what we do. The director, the staff, the board of control have all shown their willingness to do the best possible and in the past have done magnificently. We have met with a temporary check. That does not for one moment mean defeat. It merely means that we must arrange ourselves for a united and consistent and persistent effort. We must all go after a larger and substantial increase in the appropriation.

#### TEAMWORK.

It ain't the guns nor armament  
Nor funds that they can pay,  
But close co-operation  
That makes them win the day.

It ain't the individual,  
Nor the army as a whole,  
But the everlasting teamwork,  
Of every blooming soul.

—RUDYARD KIPLING

Hume: I think we should have a discussion of this address Prof. Rolfs. Mr. Skinner I will call on you if you will start it please.

Skinner: Well, I don't blame the members of the Agricultural College for cussing a good deal; I don't blame them for feeling that it is up to us to stand back of them. Work of that kind is not of much good unless it is efficient. Work of that kind does not get you anywhere unless it is carried through and if they are hampered in any way by the lack of help or material it is absolutely money thrown away, and it is almost money thrown away to start it at all. We could not see what had to be done, we had to lean on these fellows because we could not travel that road, but that road is going out a great deal into the unknown. It takes brains, persistence and strong effort and the only thing for an ordinary grower to do is to keep in the middle of the road, and let these men do the experimenting and tell us which way to go. Among the men coming into the State and starting in orange groves and trucking, the great number of failures is terrible. When I lived in Pinellas



county we could number its failures in thousands and waste in hundreds of thousands of dollars. I guess that is so in every part of the State. We know that an immense amount of work is wasted just because people do not know. They have nowhere to go to find out, except to the Agricultural College. They have nobody else to learn from; and we are fast losing the men that are in that college. You have lost since this college has been started a great many very able men; very valuable men; men who have accumulated a fund of knowledge worth everything to this State. Just as soon as they have been educated and have gathered this broad knowledge some firm comes along and picks them off and we have to start all over again. It is a great mistake. Florida is a wonderful State with untold wealth that must be developed and it is our aim to make its college the leading agricultural college of the United States. There is more to be done in this State than in any other State in the United States, in my opinion. There are more possibilities, and that is a broad statement but I believe it is true. Florida is on the threshold of those developments. We are told that not over 5 or 10% of the land is cultivated. You can just dream of the possibilities of wealth and the possibilities of development that will come if people are assured of a way to success. I am in favor of a strong resolution to the Legislature, asking that body, to appropriate enough money to make The Florida Agricultural College the leading agricultural College in the United States.

Hume: I will now call on Mr. Hamner.

Hamner: Mr. President, I believe that at the last Seminar I spoke upon this subject and on the spur of the moment I called the subject, as I remember it. "The High Cost of Labor and the Low Cost of Brains." You know that we appropriated very little money for agricultural work in this State and for a number of years past I have said that we ought to think in much larger figures and go to the Legislature and *demand* a million or two for this work. We can well afford to pay it. We appropriate money for almost every other thing that comes along in very large quantities and I believe that more of us should go up to the Legislature and work. You know as a Horticultural Society, we are somewhat afraid of politics until our life is threatened. When it comes to fighting citrus canker and our backs are against the wall, we can go after money. That is taking care of a present situation and now the proposition is that we should take care of the future. I believe that when Prof. Rolfs gets up his budget he makes it too small. He asks for too little. I think the law provides that they are not permitted to do any lobbying themselves, but I know that they can get up a budget that can just knock them off their feet as compared to the past budgets and then get up a committee from the Horticultural Society to go up there and insist that they put it through.

Simmons: Mr. Chairman, ladies and gentlemen: The discussion of this subject has brought untold delight to me.

I am fortunate enough to belong to the Association that took serious notice of this subject some two years ago and we had numerous meetings with the Board

of Control, business men, besides one meeting with the faculty at the University and meetings with the representatives of the State Livestock Sanitary Board. We thought, when in session, we were in a position to go to the Legislature and get an appropriation that would be in keeping with the development along livestock and horticultural lines. The Legislative Committee of our Association, I refer to the Florida Swine Growers' Association, went to the Legislature with the bill, and when we got to the Legislature and commenced to look around, we found that everybody apparently had laid down on the job, but we did not get cold feet.

However, we had ourselves introduced to the house and therefore we feel that we can frankly say that we have paved the way and prepared path for the action you are anticipating this morning. I assure you that it meets with my endorsement and I do not think that we should stop with a strong committee. We can get the co-operation of all other agricultural and livestock associations in the State and, as Prof. Rolfs says, teamwork is what we want and with sufficient teamwork we can get what we go after if we go after it hard enough.

Mr. Stevens: Mr. Chairman, teamwork is what we want and teamwork right here. I make a motion that Mr. Rolfs draw up a condensed statement of the needs and make it big enough for this Agricultural College and Experiment Station. Give a copy to every member of the Horticultural Society and they in teamwork take it up with everyone running for the Legislature, and make them pledge themselves

beforehand; if they are going to get our support. Make them promise now and see that they keep it.

Hume: I might say just at this point that I do not think we have had a better suggestion than that one. Now some few in this audience know something about the citrus canker fight the way we put it across in 1915. We had the men pledged to pass the plant act of 1915 and the appropriation with it, before they were elected, and it did not make any difference which candidate it was, we had them.

Prof. Rolfs, will you kindly do your part and see that we get that drawn up and we will do the rest.

Motion was made that the resolution be drawn up. Motion seconded.

Yothers: Some of these fellows might go home and run for the Legislature.

Hume: Now I will say further in connection with just what I was touching upon a moment ago that our citrus canker campaign with the State Legislature has had something to do with the slackening up in appropriations for the Experiment Station. There is no question about that. I will tell you a bit more of inside history. Never yet have those interested in forwarding the citrus canker appropriations gone to Tallahassee without appearing before the State Board of Control and asking them to keep out of the field for every dollar they could do without. Now that may have been bad policy, but most of us realized what we were up against and when you have got a war on your hands you don't always think of what may be coming in the future, but I think Mr. Wartmann who is a member of the Board of Control will

bear me out in all I have just said, and furthermore, we have the co-operation of the Plant Board for that side of it.

Now in regard to Prof. Rolf's statements on appropriations you know they had some bearing. Now this is a question or problem in which I don't care what phase of Florida horticulture or agriculture a man is interested; agriculture in its broadest sense is the one great industry of Florida. It is the making of the State, it has been the making of it and we have got to take this matter home in an individual way. It is not the other fellow's business. You know it is so difficult to get this right home to everyone, that it is a part of every individual's duty, a public duty—no man has the right to live absolutely to himself—and when it comes to crises of this kind he has got to wield whatever influence he has for the betterment of the conditions under which he lives.

I have sometimes said that life, after all, should not be measured by what a man gets out of it; on the other hand, his life should be measured by what he puts into it. I do not know of any ser-

vice or any phase of what a man may put into it that goes farther and may live longer than what he puts into the public welfare, in a broad way. Now that is what every man of us individually has got to get home.

Now I have not had time to devote attention to the details of working this out, but between now and tonight I will see if we cannot get a committee. The appointment of a committee is a very important thing; that is, to get the men on it who will work, who will sacrifice self interest and those things with which they are connected at times and do what is necessary at the present time. I will bring the matter up again tonight.

I would like to pursue this further, but think we had better be getting along, but I believe I can promise Prof. Rolfs for the Society that he will get our backing.

We will now take up the matter of a resolution which I want to bring before you at this time, which is to be presented by Mr. Edwards of Ocala. As he is here I will ask him to present it.



# The Florida Development Board

John L. Edwards, Ocala.

I just wanted to say one word in regard to the Florida Development Board. Mr. Clement S. Ucker, Vice President of the Southern Development Board of Baltimore, made several trips over the various sections of the State, and impressed the people with the needs of this organization. In November, we met in Jacksonville from every section of the State, and a committee was appointed for the temporary organization. Mr. Burguières of West Palm Beach, President. Mr. Ucker was a member of the committee, also Mr. Wilson of north Florida, Dr. Bize of Tampa, and Mrs. Lewis of the East Coast and myself from the central section of the State, and we went to work to find out how much it would cost to get this organization started. The committee decided to raise \$25,000 as a temporary beginning of the work. So Jacksonville put up \$10,000; Tampa was asked to put up \$5,000; the East Coast put up \$3,000; north Florida put up \$3,000; and this section was requested to put up \$2,000. We met in Jacksonville and we found we had \$21,000 of the \$25,000. Tampa was going to send theirs up in a few days, so we accepted the charter with the understanding that Tampa come across later, and \$25,000 was supplied to go to work and advertise the resources of Florida. Of course, we expect to put on a campaign for more funds in the State in the future,

but in our present position this will get us started.

We want to get this convention to endorse the movement. The Bankers' Convention in Pensacola endorsed it, and we would be glad to have this convention endorse it. I have a resolution right here and, Mr. President, if you will allow me I will read it.

*Whereas, The Florida Development Board has been organized and incorporated to unite with the residents of all parts of the State in a common enthusiasm for Florida and in co-operative effort toward its rapid and substantial development, therefore be it*

*Resolved, That the Florida State Horticultural Society in convention assembled at Ocala, May 6th, 1920, endorse the Florida State Development Board and its activities.*

Mr. Rolfs: I move that the resolution be passed, and after it is seconded I want to speak.

Motion seconded.

Mr. Rolfs: Ladies and gentlemen, you may not be familiar with this work. I have known it before its incipency. I know Mr. Ucker and the Southern Settlement and Development Organization. This organization is entirely an unselfish work and excepting in so far as it has for its object the development of Florida. They are raising this money,

spending it freely, and in those lines of agriculture that seem to be of greatest advantage for the State of Florida. Practically every southern State, excepting Florida has an identical organization, a large amount of the funds comes from the railroad companies, and is contributed with a view of developing these regions. Now in the early development it was thought that the way to develop Florida was to sell ten acres in free domain. This organization is distinctly against the  $2\frac{1}{2}$  acre in free domain proposition; it is a fundamentally sound organization,

I know the members. Mr. Edwards is a fair example of them. You all know Mr. Edwards, and you know that unless he knew this thing to be basically sound, financially sound and fundamentally sound, he would not have anything to do with it. I want, therefore, to say that I believe it is a good thing, and the men and women that I know who are back of it are going to see that Florida gets a square deal. Thank you.

The motion was passed by a unanimous vote.

# Home Fruit Gardens

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**Harriett B. Layton, Assistant Home Demonstration Agent, Tallahassee.**

When a great man like Dr. Graham Lusk of Cornell University says, "The future welfare of this nation depends upon the dairy farm, the fruit orchard and the home garden," we more than ever feel we must do all in our power to see that these are provided for the homes of America.

Having traveled into every quarter of our State, the lack of fruit for home consumption has impressed me. I am deeply interested in this subject. However, I am sure no one realizes more fully than those present the need of more fruit trees about the homes in Florida. It is a work that needs the interest and effort of each of us.

Eminent nutrition experts tell us that fresh fruit is an essential in an adequate diet. Fruit contains minerals and vital food principles necessary for body growth and maintenance. Is there any more pleasant way of getting these food principles than by fresh fruit?

The high cost of fresh fruits in local markets, native fruits not excluded, makes the problem of supplying these necessary foods a very real and serious problem to the housekeeper. The solution, I believe, must be the home-grown fruits and sufficiently varied to supply family demand throughout the year. Constantly is the home demonstration force of this State working to have more fruits planted. We

must look to horticulturists of the State for our information and guidance.

For two years past some definite work has been carried on in various parts of the State. Fruit trees, nut trees, grape vines and strawberry plants have been ordered and distributed. Miss Partridge has referred to the work for this year, stating that Madison County has made the largest number of plantings. In St. Augustine our agent has awakened interest in the home fruit tree. The Board of Trade is co-operating with her by offering one fruit tree for every five planted.

Greatest effort, perhaps, has been exerted in the enlarging of Muscadine grape plantings, especially of the Thomas variety. Much of this effort has been educational, however. I am glad to report a membership of eighty-five in the Muscadine grape club with over five hundred vines planted. Many more would have been planted could the vines have been secured. The orders, not only for Thomas grapes, but for all fruits, have poured into the nurseries so rapidly this year that the stock was nearly exhausted.

At this point I want to express to Mr. Hume my appreciation for the splendid co-operation and help he has given to this work. He has been an inspiration and source of encouragement to me and has given all the assistance I have asked. In 1917 in Baker county the three nur-



series each gave to the canning club girls as prizes, nursery stock to the value of fifteen or twenty dollars. This consisted of pecans, fruit trees, grape vines and roses. Since then nurseries and individuals in other counties have helped in a like manner. Later that fall the Glen St. Mary Nursery through Mr. Hume offered as an impetus to Muscadine grape club work, ten vines to each ten counties in North and West Florida making the best report in vines planted in the county. These awards were made in the winter of 1918-19. This splendid endorsement together with a special price on club orders given by the Glen St. Mary Nursery has given the grape work in Florida a real start. Although the many orders for fruit trees and grape vines could not be filled, the Glen St. Mary Nursery has given preference in filling all club orders. This we appreciate to the fullest.

I want to leave with you for your consideration as a means of furthering the fruit work in Florida, four points; the last of the four I assure you the home

demonstration force will take as their especial part.

1. Adequate nursery supply. When we work up sufficient interest so as to have orders sent in, we do not want to endanger the work by not being able to secure stock.

2. Agents' orders filled promptly on dates requested. Agents are busy people with dates made a month ahead. When she sends in an order knowing the plants must be distributed immediately, she plans her time to be free when the order arrives.

3. A list of the best varieties of fruits to plant. I would suggest some nursery or nurseries make such a list for thirty or more towns in Florida, widely distributed according to varying of planting conditions.

4. A better knowledge of the use of fruits, both fresh and preserved, but especially fresh.

I bespeak the support of this Society for more home fruits for Florida homes. I thank you for your attention.

# Growing and Cultivation of Plums in Florida

H. H. Simmons, Jacksonville.

It seems entirely unnecessary for me to comment on the necessity of fruit on the farm. From the standpoint of health, as well as from the standpoint of dollars and cents, there is no other crop that means so much to the farm as the fruit crop. In fact any farmer who fails to devote a reasonable portion of his farm to the growing of at least an adequate supply for home use, is no longer to be considered an up-to-date farmer. Florida has long been noted for its citrus fruits. Throughout the civilized world the mere mention of its name brings to mind her beautiful orange and grapefruit groves, but very few people realize that our climate and soils are equally as well adapted to innumerable varieties of deciduous fruits, among which is the plum, the subject upon which I have the honor of speaking to you about today.

Oakhurst is located three miles northwest from the city limits of Jacksonville. The soil is chiefly Norfolk fine sand and blackjack ridge type and is not generally considered by agriculturist as being as well adapted to the growing of ordinary field crops and raising of livestock as the heavier types of soil. However, Oakhurst is said by our county agent to be one of the best demonstration farms in Duval county. Besides our hog and hominy phase of farming, we have specialized in pecans and plums. By actual experi-

ence I have found plums and pecans to be one of the most profitable combination for north Florida soils, but as I have been asked to speak on the merits of the former I will proceed to give you my opinion and experience with plums.

There are three variety groups, which consists of the European, the Japanese, and the native, which altogether comprises a dozen or more varieties in the three groups. There may be other varieties just as well adapted to our soil conditions, but as our experience has been with the Excelsior we can only speak authoritatively of this particular variety. It is self-fertile, that is to say, the bloom of this variety of plums are capable of self-pollenization and does not require the interplanting of other varieties to cause the setting of fruit. The Excelsior is a medium large red plum when ripe and is very juicy, and in flavor it cannot be excelled.

Most of the European varieties including the much famed Damson, thrive best on heavy clay soil, but with the Excelsior the exact opposite is true. It is at home on the well drained high light sandy soils. We know of no crop that will pay greater dividends on the blackjack ridge soils of Florida than the Excelsior plum. With this variety we have found that twenty feet apart is the proper distance for setting.

The trees may be set either in the fall or spring, perhaps the very best time for setting in north Florida would be some time between November 15th and February 1st. The strong one to two-year-old grafts should be used, and purchased from nearby reliable nurserymen. In setting our plums all broken and injured roots were trimmed off with a sharp knife cutting with a slant from the under side. The top should be pruned to a straight whip two or three feet high, with all branches removed. The tree should stand a little deeper when set than it stood in the nursery, the same as advised for practically all other fruit trees. About four or five branches should be allowed to form the framework of the top, the operator keeping in mind the proper balance of the fruit limbs. The head should, of course, be started as low as possible. The first year's growth of the four or five branches should be shortened in to within about twelve or eighteen inches of the trunk; on each of these primary branches about two secondary branches should be allowed to develop. All subsequent pruning, if any be required, should be with the view of keeping an open center to admit of as much air and sunshine as possible. All inside suckers should be pruned out. With the proper care a plum orchard should begin to bear the second year and the third year a moderate crop may be expected.

An orchard of any kind is something that requires attention and the plum is no exception to the rule. No one would think of planting a citrus grove without giving considerable attention in the way of cultivation, fertilization, pruning, spraying, etc. The plum, while not sub-

ject to near so many diseases and insect enemies as the citrus fruits, is susceptible to certain injury from a few of these causes and if let go unaided will finally succumb to their attacks.

First of all the plum orchard should be set on elevated places preferably on a northern slope. After the proper ground is selected the next thing is to see that the trees are properly set. It is not enough to dig a hole and cram the roots in and throw in a few shovels full of dirt and step on it, that is not our way of planting. After due allowance has been made for the tree to stand a little deeper than it stood in the nursery, the roots should be spread out in their natural position before the dirt is shoveled in, using the top soil and carefully packing the soil about the roots as the hole is being filled. One cannot be too careful in setting the tree.

Plum orchards require about the same methods of cultivation as any of the ordinary fruits, such as peaches, etc. In our case we have practiced the growing of oats and rye as a winter cover in our plum orchard and follow these with cowpeas in the summer and fall. With the exception of danger of introducing root knot through the cowpeas, we believe this is the best system of inter-cropping the plum orchard. Root knot is one of the plum's greatest enemies, as this disease is more to be dreaded on the light sandy soils. It is rather risky to plant any other varieties of cowpeas in the plum orchard except the Iron or the Brabham. In regard to fertilization we have found that a moderate application of any good complete mixture applied to the soil prior to putting in the oats and rye with one or two top dressings of nitrate



of soda around each tree before the plums are half grown is about all that is needed. In the absence of these cover crops and the commercial fertilizer, a moderate application of barn yard manure supplemented with wood ashes will be found to meet the demands of the plum on soils of medium fertility.

The Excelsior plum is a very prolific bearer and over bearing is frequently a fault with them. Much larger fruit will be obtained and there will be less likelihood of rot if the fruit is thinned. For the sake of the vigor of the trees, and also for the production of regular crops, thinning should be practiced. Early thinning is best, but late thinning is better than none at all. In marketing plums and for jelly making, they should be picked as soon as they show any tendency to soften. The Excelsior will bear early picking and will ripen up well in the fruit packages. For home canning they should be gathered in the first stage of ripening.

My knowledge of plum culture has been acquired from actual experience in my own grove at Oakhurst Farms. The entire planting of this grove contains about 10 acres. The first planting was of three varieties: The Florida Queen, Golden Beauty and the Excelsior. On five acres of this planting I used 100 each of the three named varieties. There was such a marked difference in the growth and development of the three varieties that I used exclusively the Excelsior for planting the remaining 5 acres of the grove. The Excelsior trees bore a satisfactory crop the second year out and continued to bear heavy crops for about 7 years before they showed any sign of decline.

Will say, however, that the trees planted on high sandy soil show a very much better growth and better fruiting quality than those planted in flat pine woods land. The planting has been a clear demonstration that our blackjack ridge land is the ideal soil for plum growing. The first planting of the grove is now 14 years old, and the trees on the blackjack land are still vigorous with an abundant crop of fruit this year, while the trees on the flat woods land are practically all dead. There has never been a year in the life of the grove that the trees on the flat woods ground has given a full crop of fruit in comparison with the trees on the higher soil.

I have found the Excelsior to be very hearty and its resisting power to the San Jose scale most wonderful. We have used the Lime Sulphur spray once a year when the trees were dormant. We have generally sprayed the trees twice per annum for the control of the Curculio one of these sprayings being applied immediately after the shedding of the bloom and the second spraying about the time the fruit is of buck shot or velvet bean size.

This grove has been used as a pig pasture and set alternately with pecan trees. As the pecan trees are now demanding all of the ground we are gradually taking out the plum trees leaving only those trees farthest from the pecan trees. We have been breaking the ground along in October each year, harrowing it down and seeding it to oats or rye for winter pasture. The ground again is plowed the latter portion of June or around the first of July and sowed with peas. These have been used as pastures

with the exception of a few years when the pea vines were cut and used for hay. The larger portion of the orchard is now pretty well checked with Bermuda grass. However, I have been unable to detect any injury by the Bermuda grass to the plum trees.

We have marketed the crops of this grove in the local markets of Jacksonville. The price up to 1916 has averaged \$1.75 per bushel crated, using a standard strawberry crate and baskets for packing. The 1916 crop was a very large one and as there was a very large peach crop that year we found poor demand in the local market. I put about 1,000 crates of fruit in cold storage. The fruit was picked just about the time it began to color, carefully selected and packed, this fruit remained in cold storage until the latter portion of September or the first of October. The temperature was kept at about 45 degrees above freezing, and we found the fruit kept in perfect condition. We had a contract with retail merchants and delivered the fruit three times a week at a price of \$2.75 per crate. The fruit would stand up about 48 hours, the color was beautiful and the flavor was as fine as I have ever tasted. The year of 1916 was the zenith of my grove's production and this was the only experience I have had in the cold storage of plums.

In 1917 we had a large quantity of ripe fruit canned by the Canning Club of Duval county. We sold some of the canned fruit, but kept a large quantity of it for our own use. Canned plums used for pie comes nearer being a substitute for Cherry pie than anything that I have ever tasted, and it has been enjoyed immensely by my family.

Now as to the two first mentioned varieties, will say that my reason for discarding them was that they seemed to be susceptible to a small bug or a kind of louse that attack the trees in large quantities, and I could not get the trees to hold their fruit after the fourth year. I had, the trees all dug up and discarded as I was afraid the insects attacking them might spread to the Excelsior plums.

Mr. Brokaw: I may have overlooked it and Mr. Simmons may have read it, but what stock do you use?

Mr. Simmons: I purchased the trees for this grove from the Turkey Creek Nurseries and understood that the roots were of the native plum stock.

Mr. Brokaw: You never examined them?

Mr. Simmons: I am sure they were of the native plum stock. Probably a hog plum, wild or sour, probably it would stand a temperature of 45 degrees above zero.

Mr. Brokaw: The year after the freeze, I know there was a very fine crop of Kelsey plums in this county. We had a great many bushels of Kelsey plums and I went out and bought the stock from a negro who used to work for us, but if there were 14 bushels of Kelsey plums on one tree 25 and 28 years ago, it was doing very fine in this country, and I would like to know whether or not the Kelsey is succeeding in this section. It is not doing well in Orange county.

Mr. Hume: You know I believe there are some soils in Marion county that will grow anything; perhaps you can't duplicate those soils in Orange county.

Mr. Simmons: I have tried using a few plums in my garden with very poor success, apparently none, but the Kelsey seems just as hardy and just as much at home in our dry sandy soil as the sour, wild or hog plum we know so well and I cannot understand why we haven't cultivated the plum to a larger extent. The products of the plum are very good indeed. It makes the most wonderful conserves, the most palatable and de-

licious preserves you have ever eaten, and I was very much interested last night in the gentleman's paper on the Scuppernong grape. Why, I have know the Scuppernong grape all my life. These fruits that we have around us in abundance are so terribly neglected and I hope today we will get away from the one crop proposition and use these fruits that grow so easily, the Scuppernong and the plum.



# How a Fruit Paper Helps Its Readers

By J. E. Ford, American Fruit Grower, Chicago, Ill.

The modern fruit paper has two functions to perform for the benefit of its readers. These are (1) to carry information, and (2) to render service. The function of carrying information is familiar to all who read fruit papers, for it is the information, the news items and the educational matter contained in the reading columns that induce us to subscribe.

Until very recent years, the conveying of information was the sole function of a fruit publication. One of the earliest fruit or horticultural publications in this country was published by A. J. Downing some sixty or more years ago. Its career was brief but notable because of the distinguished men who contributed to its columns. After the death of Downing, the journal was continued for a time by Patric Barry. The names of Downing and Barry are familiar to all students of horticulture, as these men stood in the forefront of American horticulture during its pioneer days.

Some forty years ago Thomas Meehan of Germantown, Pa., undertook the publication of a fruit or horticultural magazine called "Meehan's Monthly." Meehan was an able editor, and for a number of years his magazine was recognized as a scientific authority on the growing of fruits and ornamentals. This excellent publication continued for several years,

but its circulation was limited to a few thousand copies per issue and was not sufficiently profitable to its publisher to last long. Other publications followed, such as Purdy's Fruit Recorder, Vick's Magazine, Green's Fruit Grower, etc., and later came several of the good fruit publications still in existence.

All of the early publications has as their object but one function—that of conveying information. They were noteworthy for the excellence of their reading matter, for their contributions were largely the work of those plant lovers who founded the American Pomological Society and whose writings had their basis in the love of doing rather than the price per word the editor would allow. Because these publications were so distinctly limited to the one function of conveying information, to the neglect of any other one service to the subscriber or profit to the publisher, they gave way to younger publications that were operated along better business lines.

## Nature of Service.

From the standpoint of educational articles, the early horticultural and fruit publications in this country were no better, if as good as those of today. All of them had small lists of subscribers as compared to similar publications now in existence, chiefly I believe, because they

rendered no service aside from the educational matter that appeared in their printed pages.

This is an age in which service is desired by everybody from everyone with whom he has business relations of any size or character. Service is wanted. It is demanded and the organization that can render the most effective service to its members or customers, is the one that makes the most substantial progress.

### **Service in Answering Question.**

I dare say there are no fruit papers today that do not solicit questions from their readers upon topics requiring special information. In the editorial office of a fruit publication it is really surprising the wide variety of inquiries that are received, and particularly of inquiries that are not in any way related to the editorial nature of the publication.

It is of course, along the line of the editorial contents of the publication that a fruit paper is best able to render special service in the way of detailed information on fruit growing. In some instances this assumes large proportions. I know of one case in which a fruit publication conducted what might almost be compared to a correspondence course in fruit growing with some of its subscribers. But seldom does any marked evidence of such correspondence appear in the magazine itself, unless possibly the answers to a few questions which appear to the editor to be of general interest, although some inquiries may take days and weeks of time and much expense to supply the information requested.

### **Moulding Public Opinion.**

The moulding of public opinion is one of the services that is performed by fruit papers of today, which is intended to be helpful to its subscribers. For example, it may be desirable to bring about the organization of a cooperative marketing organization in some community. While much personal work will be involved, the campaign is made much easier if it has the support of a fruit paper that circulates largely among the prospective members, and if this paper carries information about the proposed organization and news of the work as it progresses.

I do not doubt but that you have had a concrete example of the manner in which a fruit paper can mould public opinion right here in Florida in connection with your splendid campaign for the eradication of citrus canker. To have aroused public sentiment to the right degree, and to have held it there would have been exceedingly difficult without the wholehearted support of the fruit papers, the newspapers and similar publications that circulate among the fruit growers of Florida.

### **The Law and Fruit Juice.**

While this particular form of service—the creating of public opinion, appears to a greater or less extent in the columns of the paper, a service which usually does not appear so largely in print is the service of the paper, or its publishers, in obtaining legislation of a specific nature, or the enforcement of existing laws.

As a case in point, I might mention the activities of the American Fruit Grower

in securing a change in the label on a certain beverage. This beverage had a name which indicated at a glance that it was the juice of oranges, bottled and preserved in a manner that would make it suitable for use at any time.

The label was distinctly misleading, as the beverage was nothing more than sweetened water artificially colored and flavored. Through the activities of the American Fruit Grower in bringing the pure food authorities attention to this particular drink, a radical change has been made in the label, which now bears in large letters the statement "Contains no Orange juice."

A similar activity is in progress against some other alleged fruit drinks which are nothing more than sweetened water artificially colored and flavored.

### **Nursery Stock Classification.**

Just at this time the nursery interests of this country are confronted by a serious situation in that nursery stock is regarded by transportation agencies to be non-perishable, and to be classed in the same rank as wheat or corn. This is not only a severe handicap to the growers of nursery stock, but works a still greater hardship on the planter, as nursery stock in certain important lines, is not only exceedingly scarce but is more costly than ever before known.

In an effort to secure a revision of the classification of nursery stock so that fruit trees and plants would be classified as perishable, the editor of one fruit publication has made one trip half way across the continent to Washington, and written many letters and telegrams. Action has

not yet been obtained, but the results give promise of being favorable.

Similar activity is being waged along other lines and against legislation that is antagonistic to the welfare of the fruit producing interests of this country.

### **Write the Editor.**

A fruit publication, figuratively speaking has its fingers on the pulse of a very large number of fruit growers of the country or State in which it is published, and can obtain a broad view of the attitude of its subscribers. This enables the publication to render its subscribers many both directly and indirectly, individually or collectively, which never show in print.

The editors of fruit publications are desirous always of having their subscribers write to them on any topic in which the subscriber is interested. Such letters enable the editors to know your needs much better than if they never heard from you except once a year when your subscription is renewed. By knowing you and your wants, the editors are in a vastly better position to serve you than when it is necessary for them to guess at what you want. Write to your editors often, but not necessarily for publication. Just because you write to an editor does not indicate that the letter will be published.

### **Advertisements in Fruit Publications.**

A publication of any sort is not only a clearing house for information, but its advertising columns might be compared to a department store. In them appears the advertisements of the commodities found most useful in growing, picking,



packing and marketing fruit. In any good fruit or farm publication today there is a careful censorship of the advertising, and announcements that are misleading, or firms that are not on the square are not accepted for publication. In other words, the publisher safeguards the subscriber from the purchase of merchandise that is not what it would be, and protects him in the adjustment of complaints that may arise.

There was a time when publications of all kinds accepted the advertisements of any firm that wanted to advertise, and raised no objections about the most extravagant claims the advertiser made regarding his merchandise. But those days are almost gone. The leading fruit and farm papers now guard their advertising columns very carefully, and admit only the firms that are strictly reliable and which will give the customer a square deal.

### **Many Kinds of Service Not Visible in Print.**

I have made mention of but a few of the kinds of service which are rendered by

fruit papers of today, and could make mention of a great many more. However, these few will serve to indicate that a fruit publication has an important place in fruit growing activities, and a distinctly larger purpose in existence than the mere publication of articles and items to be read.

In fact there never has been a time in the history of the world when fruit publications in every quarter of the globe had more reason for existence than today. The business of fruit growing is increasing in importance with rapidity; new problems are arising, and new people are engaging in it, both of which require information, news and special service. Legislation, both favorable and unfavorable comes up every year which needs the support of interested publications for its enactment or suppression. New, labor saving machines for the grove, the packing house, the home are coming on the market, and it is in the columns of the fruit paper, or other interested publications that words about them are to be found.

# The Marketing of Grapefruit

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Geo. A. Scott, Florida Citrus Exchange, Tampa.

I had not expected to discuss this subject this morning so I have come wholly unprepared. Whatever I am going to say will be regarding the condition that exists on the other end of the line, as we term it. Grape-fruit seems to belong to that class of articles for which the average individual has to acquire a taste. This is not true of oranges. It seems to have been, in the past, the idea of a great many people that grape-fruit should be considered in the luxury class. That has been one of the elements which has kept it in the back ground and has prevented a wider distribution of it and a better knowledge of it by the masses of the people. It is true that the jobber has insisted on a larger profit on his grape-fruit than he expected to get on his oranges; and it is equally true that the retailers expected a very much increased profit on their grape-fruit as compared to what they were willing to accept on his oranges. As a result we find that the great masses of people are not as well acquainted with the grape-fruit as they are with the orange. We find that the child, for instance, that will take an orange in its hand and carry it to school, never thinks of taking a grape-fruit; we find that the adult seems to have been content to have it simply as a breakfast food. So the grape-fruit has been largely evolved into a breakfast proposition.

Now one of the greatest difficulties in popularizing the sale of grape-fruit is going to be to take it out of the luxury class and to place it among the necessities of life and exploit it as a food proposition; something that is beneficial and profitable. If we can do that and interest the retailer so that he will reduce his margin of profit and bring the sale price down more in line with the cost, we will have accomplished a wonderful purpose. I believe that is one of the great drawbacks that we are confronting today; it is one of the things that the Florida Citrus Exchange has been combatting and I am pleased to say that during the past season in certain sections, most successfully. We have gone into communities and made it clear by means of advertising and special work that the article can be bought at a much less price than has been asked for it until that time, and wherever that campaign has been tried the demand for fruit has increased tremendously. That is one of the works we must do in this State. We must popularize grape-fruit by placing before the consuming public the thought that it is not a luxury; that it is not an article that must necessarily be bought at a very high price. The price must be brought so much lower that the fruit can be brought into the life of every family most successfully. If we can ac-

comply that, part of the problem which we are considering is accomplished.

One other thought and I am through. If we are going to bring successfully into the future market a very much increased quantity of goods, we have got to arrange our shipments in such a way that we do not, in the first period of the shipping season, kill the demand or postpone it for weeks and almost months by the shipment of green and immature fruit. (Applause). And any shipper who is so short sighted as to lose sight of that fundamental and most important fact is doing an injury to every grower of grape-fruit in the State of Florida. ( /      )

That is all practically gentlemen, that I want to say. Working on these two extreme ends; give the consuming public a product at the very first part of the season that will strike and please its taste. It will take it on and start in to use it at once and will use it in large quantities right through the entire season. This may partially prevent the gluts that often come farther on. At the same time get in touch with the other end of the line, and bring down the price and move it from the luxury class.

Dr. Ross: I am very much interested in what has been said. Five or six years ago we journeyed to St. Augustine and met the representatives of 20 or 30 transportation companies and at that meeting we insisted upon it that we must have a special classification for grape-fruit or the industry would be ruined; that grape-fruit could not withstand the tariff put upon the transportation to market. The next year we had a short crop. I have not heard a word since; we have gone on selling grape-fruit.

This year has been the largest crop ever produced; more grape-fruit has been sold than ever before. Last year we made a careful estimate of the prices received for grape-fruit, and we found that we were four cents lower than the price received the former year. The price is going to be larger this year than it was last year with a shorter crop and that, in spite of the fact that the sugar supply is short; in spite of the fact that the grape-fruit matured six weeks later than ever before and the bulk of the crop was shipped before it was fit for anybody to eat with sugar or without it.

What is the matter with grape-fruit? Nothing is the matter with grape-fruit. The people of the United States will be ready to buy at any price when it is marketed systematically and when it is mature. Five years ago, when we had this conference at St. Augustine we came back home, those of us who marketed co-operatively, and said we must, we would begin today to market grape-fruit. I put up the idea that grape-fruit was health producing, conducive to digestion of all other foods, and was in itself a tonic. We timidly ventured that into our advertising and immediately we began to get replies asking where did I find the authority for placing grape-fruit in that category. When I read over the doctor's papers there was not a syllable backing me up. However, we have been saying it every since; it has cost us one-half million dollars to say it; to say it in medical journals. The result is that in the last few years there have been many medical testimonials backing up everything we claimed. With the literature to back us up, now we can print a book



so big that you have to have a truck to haul it around. Every medical magazine has backed up what we had to say, and commented on the fact that oranges contained more food value than a great many other things; that grape-fruit is a tonic, and is conducive to the digestion of other kinds of food. The whole medical world is back of grape-fruit today; as the lady said, everybody in the medical profession who has any sense.

Now my friends, don't get scared about grape-fruit. The mariner who starts out and encounters a storm and lashes his wheel and attempts to combat the elements and to continue the voyage with the wheel lashed will never get to his destination. But marketing grape-fruit is a science. It needs advertising. It needs distributing. In the great United States of America with its one hundred and twenty millions of people, there is a little

area down here in Florida that produces all the grape-fruit that is worth while aside from a little bunch in Porto Rico; why, my friends, the area in which grape-fruit is produced is about as big as my thumb nail when compared with the area in the whole end of this hall. You can't overdo it. You cannot produce too much, if you market it right and advertise in a big way.

This year we have spent \$154,000 and we have spent one half million dollars in the past. We have made our contracts for next year; our literature is being printed now. We will spend \$200,000 or \$250,000 next year in advertising Florida grape-fruit. (Applause). If we could get in behind those people who are marketing co-operatively and do our share toward doing this, grape-fruit will have a walk-away and make everybody in Florida rich. (Applause)

## Report of Committee on Ornamentals

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Mr. Hume: We will now take up the first of tonight's program, that is the report of the Committee on Ornamentals. I am going to ask Mr. Mills to take charge of this part of the program and introduce the other speakers.

Mr. Mills: Mr. Chairman, Ladies and Gentlemen of the State Horticultural Society, this is my first offense as chairman of this organization. You will have to blame Mr. Hume for it. I feel considerably like the woman in a story that I believe I will tell you. I am not sure whether it is an unwritten law in this organization that you can't tell a story or not; I notice there has not been many of them told, but if it is allowed, the story I have in mind is related thus:

One summers afternoon down on one of the beaches outside of Jacksonville a young lady and a young man were sitting on the sands with a parasol at their backs to keep the suns rays off, and looking

over the ocean's waves and conversing, as young folks will under similar conditions. The man was the kind that is always sticking a pencil in his mouth and so his conversation lagged a little bit, and he was writing in the sand every once in a while and then sticking his pencil in his mouth. Finally the young lady turned and said, "George I thought you were going to kiss me." He said, "I was but my mouth is full of sand." She said, "swallow it George, swallow it, you need it in your business."

In view of the fact that we are trying to save time and rush things through tonight I will omit anything I may have to say until the other members of my committee have had a chance to be heard, so I wish to introduce to you at this time Mr. W. A. Cook a landscape artist connected with Reasoner Bros., Oneco, Fla., who will give us a paper on the Home and the Grounds.

# The Home and the Grounds

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W. A. Cook, Oneco.

The subject of Landscape Design is so broad in its scope and involves so many elements of great magnitude that to attempt a general discussion of the art in the brief space of an informal discussion like this would be quite futile. Everyone interested in the subject of ornamental horticulture has a fair conception of the aims and ideals of the profession as understood at this time, so I am going to limit this paper to the home grounds, approaching the subject from what is perhaps a rather unusual angle and will attempt a treatment along practical rather than purely theoretical lines. If I digress a little I trust that you will be indulgent as the temptation to do so is necessarily great with so big a subject.

Now some may disagree with certain conclusions arrived at, especially when they seem to conflict with popular conceptions of home-grounds ornamentation. Please bear in mind, however, that these conclusions represent, as is the case with most knowledge, the collective opinions of hundreds of eminent practitioners of our generation as well as many of those of former days. True, opinions differ even among experts in respect to the practical application of principles, as is quite proper—the broad principles themselves, however, remain fundamentally unchanged, and probably always will. So much by way of introduction.

My subject tonight is on the *relation* of the house, or home, to the surrounding grounds. Please give that thought special consideration. I am not going to attempt a general treatise on home grounds ornamentation—it is too much to “surround.” What I have in mind is to correct a too-common conception that landscaping is just decorating the ground with trees and shrubs like hanging medals on a soldier’s uniform, without regard to the necessity of making the ground reflect the very soul and spirit of the home and establishing a strong, definite relation between the two—virtually tying them so closely together as to be inseparable. It is this idea which I wish to elaborate.

First I am going to call your attention to what may easily be considered the most important general element in the garden design, as with that of the house—*style*. I do not, by style, mean *class*—I refer to its type or character. To illustrate, you would not think of having Spanish iron balconies and grated windows on a Dutch Colonial house nor a Colonial entrance of the Revolutionary period on a splendid tile-roofed Spanish mansion. Well, why not extend the same practical principle to the garden! It is not to be understood that one should *duplicate* the old gardens any more than that, in adopting a certain old style as model for the house, one must duplicate



all the unsatisfactory and often unsanitary conditions of the period! Modern gardening, like modern architecture, calls for adaptation or modification of old styles, if used for models, rather than exact reproduction. The point should be made of catching *the spirit of the home* in harmonizing garden to house—there is the idea! If you have a Spanish type house of strong, severe lines in bulk and cool shadowy arches making strong color effects of light and shade, project the same feeling and atmosphere into the grounds. If it is an American colonial house, carry out the garden on the same stately, impressive lines. If the house is a “junk-shop” of architecture by all means the grounds should reflect *that* idea—or lack of it. If the cook-stove is kept in the living room, the piano in the kitchen and the fine paintings hang on the chimney in the attic, then by all means let us clutter up the grounds with scattered, purposeless, lonely looking exotics. But if our houses are to be carefully arranged, in good taste inside and out, then let us adopt the semblance of that consistent, well-ordered adjustment in our gardens as a personal pleasure and satisfaction to ourselves and as a model for emulation to the community!

It is agreed, then, that the style of the architecture and spirit of the interior of the home should govern the delineation of the garden—how, then, is this to be accomplished by the average home owner? The answer is—*by study!* This should include some study of the history of gardening, surely, but especially study of the working out of problems similar to yours in the splendid achievements of the best Landscape Artists of our generations.

This can most effectively be done by inspecting the gardens which have been laid out for a number of years, such as the large parks, estates and private homes in the older sections of the country. Where this is impossible, as is usually the case, get some good books on the subject as well as subscribe to a good magazine on gardening. Time is too limited to enter on a discussion of the art as a whole—what I wish now to do is to make a few suggestions that will assist you to get something of the element of *unity, harmony and logic* in the general arrangement of your home-grounds plan.

Before anything else, make a careful study of the plan of your house before attempting a plan of your grounds. It is positively astonishing how few people appreciate the importance of this consideration. No end of correspondents write something like this—“I intend building a home on a two acre tract—how shall I plant the grounds to make them beautiful.” No reference to the house problem at all, you see. Or this—“Send me a stock plan for my house lot, 100x250 feet.” The general idea seems to prevail that landscape plans are largely cut to pattern and assembled like a Ford car! In many cases it is necessary to write repeatedly for a plan of the house because the owner considered that as unimportant and that he “just wanted his grounds beautified.” Just there is where most people miss the vital point. They fail to grasp the fact that the purpose of ornamenting the home grounds is most largely for beautifying the home itself—in fact, they fail to appreciate that the grounds should be as much a part of the home unit as the house. And you cannot beautify the house in the

grounds intelligently without a study of its plan and architecture any better than you could intelligently design a color scheme for it!

If your house has not actually been built, you are at great advantage, because you can then have one designed to fit *your* particular piece of property and to carry out your carefully studied plan for development. If you will make even a casual study of houses, especially those out of town where not restricted to a 2x4 lot, you will be surprised at the great number designed without any regard to the character of the grounds and immediate surroundings. For example, you will frequently see something like this—ground sloping sharply and the house built on *long lines against the natural contours* instead of *with them*. The result means digging the back of the house into the hill or setting the front upon stilts, or moving half the hillside in an effort to get adequate terraces to off-set the bad effect. And when you get into very extensive terracing you get into very extensive troubles, practical and financial. This is merely one of many common errors of the designer failing to understand conditions or, probably more frequently, of the owner using some "stock plan" to save architects charges. This is usually false economy and much like taking patent medicines to save physician's fees.

We will assume now that, as in most cases, the house is already built; what should be the proper course of the owner desiring to work out his own problem? Because of the wide range of the discussion we must ignore the problems of type and period of architecture which should of course be considered—this will be as-

sumed as having been carefully studied and determined. The next step is to make up a list of the various special elements you wish to include in your little homestead, as "formal garden, tennis court, roque court, playground for the youngsters" or whatever you desire and is practical. Then decide whether or not you will include your flower garden as an element of the enclosed garden, if you will have one, or whether you will treat that separately; the area to be devoted to each, etc. These and a multitude of other problems should be given careful consideration for upon them collectively depends the success of your gardening effort. And a plan, once carefully designed and executed, should not be changed except under the greatest "provocation."

The necessity for brevity forbids listing and amplifying the many points involved; I will therefore make just a few further suggestions on some of the most important ways for you to get a consolidated effect, and then exemplify a little with the enclosed garden. I am assuming, throughout, that you appreciate of course the absolute necessity for a plan and have one of your grounds, made either by an engineer or by yourself, drawn to scale and showing the location and ground-plan of the house with doors and windows properly located, walks and drives if already suitably arranged for, garage and other outbuildings, trees, and all other objects of a permanent nature. You will also have before you the list of essential elements that you wish to incorporate in your grounds and the approximate space to be allotted to each. With this well in mind, you proceed to apportion the ground from the standpoint of utility,



harmony and artistic effect. Considering that the house and grounds represent a unit, the next step will be to consider the views of the *outside* as seen from the *inside* of the house and prominent porches. From the centers of the windows and doors draw straight lines at right angles to them on which to construct your vistas. Now "vista" means something more than the primitive literal translation of "view"—a vista is a view, but a view may or may not be a vista. On the open plains and deserts you have views but not vistas—in the woods, looking through openings in the trees, or between mountains, you have distant views framed in, so to speak, which are properly vistas. Hence the importance of making or preserving vistas and to those of us who, because of the requirements of civilization, must spend much of our time indoors, the importance of having these vistas as attractive as possible is self-evident. This factor is often slighted to great disadvantage. These vistas vary in importance and character, which is necessary and desirable, as it contributes variety, but all should be carefully preserved and receive proper consideration.

After tentatively arranging the views from the *inside*, consider those from the *outside*. Draw vista lines from frequent viewpoints on the grounds and approaches to the house, especially emphasizing certain architectural features, views at tangent, etc. As you are mapping these out and analyzing your work from step to step, other considerations will present themselves which you will treat as special problems and decide according to their merits.

These points all determined, you are ready to assemble the various units of the grounds. In doing so you will first consider the practical problems involved—soil, exposure, desirability for closeness to or remoteness from the house, accessibility from the standpoint of cultural and other problems, as in the defined gardens. Then so arrange these elements as to best serve their purpose, yet at the same time taking advantage of the vistas to obtain the most attractive view (or not obstruct any) to develop the atmosphere of spaciousness rather than cramping, touching up the whole with plant materials, garden accessories, etc., to get the finished picturesque effect so much to be desired. In this work you will find it helpful to cut out pieces of paper of proper dimensions according to the scale of your plan, each to represent one of these elements you are laboring to assemble. You can work them around on your plan and get a more graphic idea this way than by drawing and erasing, which is often confusing and puzzling. For instance, a tennis court for doubles takes a minimum space of 50x100 feet for satisfactory play—make your piece of paper representing the court accordingly. Figure out about what you need for a vegetable garden, and treat it and the others the same way. If they do not work out just right as to area when you have them placed to suit, you can extend them a little or pare them down to conform.

Right here let me observe that this is no simple matter, this arranging your grounds on a practical and at the same time attractive basis. The satisfactory evolution of a plan for the grounds is largely a matter of training and exper-



ience for this particular work as well as study and temperament. If it were easy, everyone would have fine gardens and grounds. As a matter of fact, there are few well designed, properly balanced gardens other than those executed by persons of some special training and qualifications. As with designing a house, it is an art and profession all its own. Still even then, careful study by any amateur gardener will produce results if the matter is taken seriously and deliberately. When you go home, make it a business to go the rounds of your rooms, studying the views from the various windows and asking yourself if they could not be vastly improved with a little studied effort. Look over some copies of Garden Magazine or House and Garden and after considering the possibilities of your place further, be absolutely candid with yourself about the entire matter. It is dollars to doughnuts that you *will* do something about it.

It is hopeless to think of covering anything like all the ground tonight—but I do want to go a little into a very neglected feature of Florida home grounds—the “enclosed” or often so-called “formal” garden. It is not only neglected but very much misunderstood and unappreciated—it should really be looked upon as an essential rather than as a luxury in our State. The popular conception is of an elaborate and expensive semi-architectural development whereas it can be as modest and simple as requirements justify or necessitate. Of all the States in the Union this is certainly the one to which the out-of-door life is best suited during the greatest number of days of the year. For that reason, if none other, we should

avail ourselves of this priceless opportunity to truly live outside the walls of our houses. However, the tendency with American gardeners has been to develop the idea of publicity rather than privacy in the grounds, doing away largely with enclosing walls or hedges. So on more or less restricted grounds, then, we are compelled to entertain ourselves and friends indoors or be more or less annoyed by the observance of the public. In short, we cannot this way have that element of privacy on our grounds that we enjoy in our house, which is fundamentally wrong. While absolutely American, I count it no crime to believe that there still are *some* few things that they do so much better in Europe—and that of enjoying the garden is one of them. There, especially in England, the walled or hedged garden is an ever present feature well worthy our emulation.

As I have laid some stress on this point of the enclosed garden, I suppose that a few of the details relating to it will not be out of order. One of the most important is *location*. The garden of this type is virtually what one might properly designate as an “out of doors living room.” I cannot think of any other term that quite so fittingly suggests its chief charm—that of privacy—and yet at the same time so aptly suggests its sphere of usefulness. For this reason it should be comparatively near the house, proximity depending on the character of the building, the grounds, and other local conditions. That it should be on the axis of one of the most important vistas from door or window—preferably the former—is quite obvious. It is the most attractive extension of the home idea into the grounds, and should be seen

frequently and to the best possible advantage from the house. Don't put it at some obscure place in the grounds just because there happens to be a little room left there, or cut up a fine greensward with it just because it "looks pretty," but establish it with some strongly defined and direct relation to the house itself.

Preferably the level of the garden should be below that of the house—how much is a question of existing conditions and type of development. You should look *out* of the house *into* the garden—the *garden* should be subordinate to the *house*, not the *house* to the *garden*. Occasionally circumstances compel a garden at a higher level—this can often times be worked out satisfactorily but requires special skill in handling. That the enclosed garden should normally be based on rectangular lines is also obvious as well as that it should be, in itself, level. Preferably there should be only one level though under special conditions a single enclosed garden can be successfully built on *more* than one level. This also requires very special treatment. This type of garden is, on rare occasion, built on rising ground without levels, but that is difficult and involves special conditions and treatment.

I wish there was time to go into the question of plant materials for this class of garden, to study the mirrorpool in the garden, and discuss pergolas a little and a few hundred other points about gardens, always a fascinating theme—but there is not. And there is little use in attempting a summary, for this paper in itself has been, and could be, little else than that.

But in conclusion it should be repeated, and that in no uncertain terms, that good landscaping of grounds is no more "easy" than most fine arts—the tantalizing thing is that it is just simple enough to be ever leading us on, will-o-the-wisp like, with a small measure of success into a slough of complications undreamed of at the journey's start. You know how studying a new language is—you acquire a small vocabulary of words, a little knowledge of simple grammar—just enough in five or six lessons to make you think it is easy. Then you get into verb construction and the practical application of the language and you are "all up in the air" so to speak, and either buckle down to real study and work or give it up as a hard job. Now, that is my suggestion to you tonight—if you are going to have a garden, make it something like a real one—don't put up with the meaningless scattering of solitary shrubs over the lawn. This isn't a garden—just an "Old Fashioned Curiosity Shop." Better build on a city lot and forget gardens. If you have a house and adequate grounds, make the latter worthy of the former—don't be satisfied with anything less. If you want a real garden to set off a real house, make a study of the problem so that you can achieve something that will approach the ideal of harmony, consistency, and beauty.

I thank you for your considerate attention.

Mr. Mills: I am sure we are greatly indebted to Mr. Cook for such an able paper covering the subject so thoroughly. I do not believe there is one of us but what has profited by hearing this paper. Is there anyone wishing to discuss the subject or ask any questions?

Is Mr. J. M. Pemble of Leesburg present?

As he is not present, if there is any one here who can give some information or would like to discuss the growing of *Asparagus plumosa*, we will now give him an opportunity.

Mr. A. E. Cline: I found that the growing of *Asparagus plumosa* here is something which very few in Florida know much about. I am one of the newest ones connected with the business, coming to join one of the largest ferneries only a year and a half ago and what history I can give you is all hearsay; but from what I have been told the first start in growing *Asparagus plumosa* as a commercial proposition was made by Mr. P. H. Drake at Tallahassee about 21 years ago. From that start the industry has spread until there are ferneries on the east coast from St. Augustine to Palm Beach, and then down the center of the State at DeLand, Altamonte Springs, Auburndale, Yalaha and a lot of them also down around St. Petersburg and Clearwater. They are spreading all over the State. I have a list of something over thirty growers and have been told that there are over forty growers, and somewhere between 200 and 250 acres of *Plumosa* growing now commercially. That would mean if there were that many acres an investment of nearly a million dollars. Not much when compared with citrus, but something in Florida; quite a start for a 21 year old boy.

It is grown largely by the smaller growers. There are a few places from ten to twelve acres in size I believe, but most run from one to four acres. Most are grown under slats, that is to say un-

der half shade, with thorough irrigation system. This means quite an investment. It is hard to estimate the average output from these different ferneries, but I should imagine it would probably be around \$5,000 to \$6,000 a year. Practically all of it is shipped northeast and west. There is very little used here except in Jacksonville and Tampa perhaps; the large bulk of it goes north.

I am told that when the *Asparagus* was first started here the growers were told that no bug would touch an *Asparagus* fern. But evidently somebody advertised it to him, somewhat the same as the growers have advertised grape-fruit through the north. The bugs have acquired a taste for *Asparagus* and we have the red spider and the caterpillar to fight day and night. It means eternal study, eternal persistence and eternal assistance to combat them and it is hard to do it at that. Then the weeds are always with us. The *Asparagus* grows in all directions and is so interlocked that it makes a regular mat on the ground close to the surface. There is no form of cultivation that can be done after the fernery gets a start; nothing but hand pulling of the weeds and that means labor and much expense under the present high prices. Then of course there is the irrigation.

I think considering the amount of money invested and the income brought into the State from the outside that we are entitled to a little more help from the Experiment Station and possibly from our fertilizer friends who are interested, in our attempts to solve more scientifically the problems of the *Asparagus plumosa* growing. There does not seem to have been any real form of co-operation among the growers. It has been a



little bit of every man for himself; every man telling how to do this thing or that thing; some wiseacre telling him this and that and giving him a lot of misinformation that is no better than he knows himself. But the grower is willing to try them all. I think in that way there has been a good deal of harm done to the industry. It needs more scientific attention. There seems to be no one who has made a study of the needs of the fern as compared with the other industries in the State. I think the Plumosa growers are to blame; they should get behind the Horticultural Society, both individually and collectively and ask the Experiment Station to help them out. I think it can be done.

It is not any get-rich-quick proposition but a scientific business that should be handled as well as any other crop. I think it means a good deal to Florida in the long run because there is a demand for it in the north. It is the southern florists that are growing it more and more and the northern florists are going out of the business. We can grow a finer fern, a nicer fern and a prettier fern here than can be grown in the greenhouses of the north. I have visited the northern States and have seen what they can grow locally, and it is simply co-operation that is needed to help the industry out.

Mr. Mills: I am sure we are all very grateful to Mr. Cline for that talk on *Asparagus plumosa*. Is there anyone else who wishes to discuss the subject.

Mr. ———: Mr. Chairman, I want to say just a word; I want to voice a protest in relation to the term *Asparagus fern*. That is a wide spread misnomer. It is not a fern of any species whatever and when we refer to it as an *Asparagus fern* we infer that it is an asparagus-like fern.

Now if you want to call the plant asparagus, I have no objection whatever. It is somewhat fern-like but has no relation to the fern family.

Mr. Mills: I think Mr. Cline we must both concede this.

Mr. Cline: As he said it is not a fern and the term is a misnomer.

Mr. Mills: All the ladies who come in to buy flowers want some of that pretty fern to put in their flowers, and it is hard to educate them up to the fact that it is not a fern. Commonly among florists it is easier to face that disgrace than to inform the public to the contrary.

I have been interested to some extent in a plumosa growing proposition during the past seven or eight years, and while I have not been in direct touch with plumosa growing I know that Mr. Cline's statements are correct; and several times I thought that we were on the verge of making a killing as the saying is, but something always happened. Your suggestion is a good one and I think we should have more co-operation. In fact I found, when I first went into the business, a loathsome aversion on the part of the growers to give any information to a new fellow. They did not seem to want to impart any of the knowledge they had acquired. We want to get away from that, we should co-operate and work together and in that way I believe we can develop a growing plumosa business and this would be a big advantage commercially to this State. We not only can grow a better and prettier frond or spray of *Asparagus* here but the great consideration is that it can be grown so much cheaper because they have to grow it in greenhouses and the space in greenhouses is worth money, while we grow it out doors.

# Beautifying Florida

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Mrs. W. T. Gary, Ocala.

I would like to prepare a paper on something about Woman's Clubs and Ornamentals. Since Women's Clubs are more useful than ornamentals, my thoughts positively refuse to flow with the ink in my pen, therefore, I stand before you tonight without any paper. But I will make a few remarks on the subject of Women's Clubs and parks and drive-ways.

I wish to thank the President for giving the Women's Club a place on your program. I bring you greetings from the State Federation of Women's Clubs and from the Woman's Club of Ocala. I will say just here that we have enjoyed very much having you here in Ocala. We feel honored in having you hold your sessions in our club house, and we hope it will not be thirty years before you come back to us again. (Applause.)

At one time in my life when I was associated at the Agricultural College in Lake City with Professor Rolfs and Mr. Hume, I was studying plants, and I thought that if I should be shipwrecked in mid-ocean like Robinson Crusoe and left alone on an island I would be perfectly happy if there were just a few plants around. Since then I have been working with Women's Clubs and with people and I am perfectly happy in working with them now; and tonight then, I ought to be very happy, because I am bringing

the plants and the people together, and I hope that in the future my work can be with both of these.

It has been my desire for a long time that my influence in this town should be for beautifying it by establishing a park in the city, and I can say tonight that my wish has been fulfilled this year, because the Women's Club of Ocala recently dedicated Tuskawilla Park and the Victory Arch. At the 13th biennial meeting of the Federation of Women's Clubs, in New York City, the statement was made by the chairman of forestry that, "the acquisition by the Florida State Federation of the Royal Palm Park is the most important single achievement of any state federation in the past two years."

If the white man, following DeSoto on down through the years, had taken the stand toward preserving our natural scenery that the women in the State Federation have taken, what a different State we would have now. Florida would indeed be the land of flowers, but sad to relate, the race, in its development, must go through the same stages that the individual passes through. It seems that man has certainly been passing through that destructive period; the period of destruction in the life of a boy, for since the time Florida was first discovered by the white man, what ravages have been made

on the forests and natural scenery of the State. They have certainly destroyed a great deal of beauty of our State. The forest fires have been allowed to burn and destroy the seeds in the soil and the humus, impoverishing the soil and making impossible the rich verdure we would have had otherwise.

Of course, you are all familiar with the devastation brought by the turpentine and the lumber men. This all goes to show that man has been passing through the period of destructiveness. But during the last few years, the word conservation seems to give us hope, that this period in the life of the race has been passed. But we are doomed to disappointment, for along comes the Dixie Highway, cutting out everything in its way; cutting out all the pretty little trees at the side of the road and leaving it perfectly bare; leaving the autoist exposed to the hot rays of the sun. Well, what can we do? We see that man has not yet passed through this period. Well, the only thing that we can do is to call on the women to come to the rescue, (Applause) so I recommend that everywhere we must organize Women's Clubs.

A great many of the larger clubs in our State have come from village improvement associations. This club in Ocala which now numbers over a hundred and fifty members, originated in a small village improvement association. We must establish these all through this State, along the Dixie Highway and have the women begin beautifying the highway in the wake of the men who go along destroying our beautiful shade trees.

As examples of what Women's Clubs can do to beautify cities and highways,

I might mention the park in Jacksonville, which I understand was developed through the instrumentality of Women's Clubs. Orlando has been greatly beautified by the work of Women's Clubs, and as I said recently, in Ocala we have started a park here. Then, I might mention the wonderful work started in St. Lucie County a number of years ago, by the clubs in that county. They planted palms, oleanders and other ornamental plants along all their highways.

We think Florida is destined to be the greatest State in the Union. I think Florida has passed her darkest days. She has a great future before her, a very bright future. If one had to depend entirely upon what is heard at this convention to give him the information of Florida's resources, of course, he would have the idea that it comes entirely from the fruit growers in the State, but we must not overlook the tourists. We depend on them very much for developing the State; for the interest that it brings into the State; for the money and various other things, so we cannot overlook the tourists in developing our State.

The tourists come here from the north, from the snowfields, and they want to see tropical vegetation. So I advocate the planting of tropical ornamentals and plants, which flower during the tourist season. Of course, we do not want to confine ourselves entirely to the plants which flower during the tourist season, but a portion of our grounds, at least, can be devoted to the plants that bloom during the winter months. For our own pleasure we can have other parts of our grounds decorated with plants which bloom later in the season.



I would like to mention a number of the plants which are native to our State, which can be used as ornamentals. Members of this committee will not appreciate my mentioning this I know, because they probably put me on this committee to help them advertise their wares, to help create the market for their cultivated ornamentals; but I cannot resist calling your attention to the numbers of native plants which can be taken from the woods and transplanted to our grounds. We have the wild plum and many others that I might mention, and I think we could make a beautiful Japanese Garden. It would of course, have to be Americanized, as everything must be at the present day, but in this Japanese Garden we could have the wild plum, the peach, a beautiful tree in the spring, as it blooms and later gives us fruit. Then we could have the bamboo; this, of course, is a cultivated ornamental. And in our woods toward Lake Weir you will find a beautiful little grove of haw trees. When these have come into their beautiful green foliage in the spring, it gives a very Japanese-like effect and this could also be used in our Japanese Garden. So let us not forget—although we depend largely on the cultivated ornamentals—that we have in our own forests beautiful ornamental trees which we can use in our landscape gardening.

When women began to find that their influence was good in the home, they found that it was good also in the town, and they began to use their influence in brightening the towns as well as their homes.

The greatest compliment I ever heard paid to a woman was this. A young

man made the remark to a mother, that he loved to come there because it seemed as if people lived in that home. And that is the way it ought to be. We want them to look as though people lived in them.

When we dedicated our park the other day, we told the legend of Micanopy and Tuskawilla. Once upon a time a great Seminole chief had his campfire on the site which is now known as Micanopy. But unlike the other Indian chiefs, Micanopy loved not to wander but was content to sit down about his fire smoking his pipe in peace. The reason of Micanopy's contentment was this. In Micanopy's wigwam there was a beautiful woman, Micanopy's squaw. This beautiful woman was not only beautiful but she was known far and wide for her wifely qualities and the art with which she kept the home fires burning. His wife was Tuskawilla and she it was who charmed him so that he cared not to wander. That we thought was a very beautiful and appropriate name to give our park.

And we want always to bear in mind that it is the charm of our park that is going to hold our people, and this is what we want to do in our State. We want to beautify our State and make it so charming that people will not only want to come here and spend the winters, but will want to come here and live.

Mr. Mills: I am sure we are all delighted and appreciative of Mrs. Gray's splendid talk, so much more interesting when she can stand up and talk it.

I do not know where the report comes in, but possibly Mr. Cook and myself are interested in having Mrs. Gray advertise the cultivated ornamentals. I believe I

would like to say here that I think I can claim the honor of being the first one to popularize around Jacksonville, one of your native plants. I do not think even our esteemed President, ever saw its use or appreciated its worth until he saw a specimen growing in my yard in Jacksonville. I call things by their common name; I let Prof. Hume and some of the other college graduates call them by their technical names. I speak of the common palm found scattered in places in Florida, and commonly known as the Needle palm. I found in planting around Jacksonville, that one of the great difficulties is to find some ornamental that is tropical and yet something that won't get too big after a while for the place where you put it.

I have a little palm planted 14 or 15 years ago that today stands eight feet high with a spread of twelve or fifteen feet; just one magnificent, symmetrical, splendid mound of green, splendidly hardy, tropical beauty and it never has been affected by a freeze. I never saw one touched by a freeze, and yet it has all the beauty and tropical appearance of any other palm. There are other plants, as Mrs. Gary suggested that we can use in decorative and ornamental planting. I am particularly interested in the plants that do not get too big for the place.

For the last ten years, I have been interested in the beautifying of a cemetery. Now that may be a dead subject, but a very live one to me, because that is one place of all others that we want beautiful. But we don't want the things that eventually get too large because there are lots and lots of places where we need the little effect of the palm or shrub, but we don't want it to get to be a tree after a while,

because it is out of place. I have found in that work that this Needle palm comes in very nicely, and also one or two of the Sago palms.

I am also using for that purpose the so commonly called Sacred Bamboo of Japan. I think Prof. Hume told me the other day it was called *Nandina domestica*. It is the palm they used to spread before the temple in Japan. I have one at the side of my house that has never gotten above the top rail of the porch, and it makes a beautiful filling in plant. It is of slow growth, slow to reproduce or to propagate, but beautiful in effect and splendid where you need the small and not the large shrub.

Now there is just one tree in Florida at this time I want to pay my respects to. When I first came to Florida, I am frank to admit that the Magnolia appeared to me to be about the finest tree in Florida, and I had a great deal of regard for the water oak because of its easy transplanting and quickness of growth. But in the last ten years I have learned to take off my hat to that kind of tree, to my notion the greatest tree in Florida, the live oak.

I tell you folks, don't waste any more time planting water oaks on your streets. One time in a trial in court, where the destruction or death of a water oak was at stake, they got me up there for expert testimony. The lawyer asked me this question: "What do you consider the average life of a water oak"? And I said 25 or 30 years and he said "don't you know that there are trees in this town 40 years old." I said "you asked me the average life of the trees and I can show you plenty planted out that died in 15 or 20 years."

Just when the water oak tree gets to be the perfect, magnificent tree you want it to be, it begins to go back, but you can see live oaks, the beginning of whose age runs back behind man's memory. I have stood and looked at one of the giant specimens of the most magnificent tree the Almighty ever put in the ground, and to me the greatest natural evidence of the power and ability of a Creator. When you see a live oak with a limb running out 50 to 60 feet like that one, carrying all its weight of branches and foliage, swaying in the storm and not breaking off—can you do it with steel, or iron or bronze, or brass, or any other agency of man put out there fifty feet with no other support, that will stand the strain?

Folks, it speaks to me of the Almighty, and I say I stand before it with awe and I take off my hat to it as the one great supreme, magnificent tree that Florida ought to be proud of, and ought to plant

wherever we need shade in our homes, our streets and in our parks. But I say, don't crowd it; give it plenty of room; make it the perfect, symmetrical, magnificent specimen that it will be under favorable conditions.

I thank you.

Mr. Hume: I think Mr. Mills was thinking of a tree in Jacksonville, standing near Keystone Park. If you have an opportunity to see that tree, don't miss it; I don't know where there is a live oak anywhere in Florida that compares with it—I mean for the size of the branches, for its general symmetry, its general beauty and its enormous size. I suppose I do not exaggerate when I say that tree is upwards of two hundred feet in its spread of branches. It is a wonderful specimen, and worth anybody's time to take the trip across the river to see it and it fully comes up to what Mr. Mills was saying in regard to the live oak.



# Growing Grapes in Florida

By F. J. Zimmerman, Oldsmar, Florida

Being closely allied with viticulture in the Southern part of Texas for a number of years, we found such information as we had obtained in this line to be of much advantage to us when making a special study of the grape industry in Florida, which study we have been closely following for quite a period of years. Years ago our attention was attracted by a large wild grape vine, probably of the Little Mountain variety, growing on the banks of the Nueces River in South Texas, the vine being about fifteen inches in diameter and reaching to the tops of the tallest oaks. On close investigation we learned of the scarcity of vineyards, not only in South Texas, but along the entire Gulf Coast, and especially of Florida. Many a dire tale of experience have we heard from residents of these sections.

Having visited many of the vineyards of the South and noting varieties closely and taking advantage of that great store of information learned first hand by such men as T. V. and W. B. Munson and Herman Jaegar, who spent many years of experimenting with hybrids, we now have collected in our nurseries something over sixty varieties of grapes, exclusive of wild or native varieties. Many of these are crosses of two or more varieties, and we are closely classifying them as to their adaptability for different soils and sections of the South. We find the Carmen

and the Jaegar two of the best black bunch grapes for this region, having yielded well and resisted disease remarkably well, especially when well cared for.

The experience with the Labrusca and vinifera varieties of the northern States in the extreme South shows that they are very short-lived here, succumbing quickly to disease, especially phylloxera. The vinifera varieties of Europe and California are found to do reasonably well only when grafted on phylloxera resistant roots.

By far the greater portion of our successful grapes for Florida are linked *Bourquiniana* and *Lincecumii*, the most disease-resistant varieties yet discovered for Florida. Among the native grapes of this State is the sweet winter grape, which is one of the best of the wild grapes for jelly purposes and arbor. It is a strong grower and a prolific yielder of big bunches but small berries; otherwise the Muscadines are held as the heavy yielders and the best arbor grapes of the South, producing very large berries. Owing to climatic conditions, we have found that grapes ripen considerably earlier than in either California or Texas, or in any other part of the United States giving us much advantage, not only in the local but also in the northern markets. Last year they sold readily in the local markets of Florida at from 25 to 40 cents

per pound. The demand was strong and the supply quite limited. They sold at 35 cents per pound down to the end of the season.

Owing to the fact that most of our grapes ripen during the rainy season, we find it necessary to put the rows 8 to 10 feet apart and the plants from 8 to 12 feet apart in the row, using the two wire Kniffen system for training the vines, this giving the fruit a better chance to dry. We have experienced no bad effects whatever from the rains, the fruit drying in a few minutes when spread on the vines. We have picked grapes from the heaviest loaded vines within a half hour after one of our heaviest showers, with no ill results.

Judging from many years of experience of others and about eight years of our own in this State, we are now thoroughly

convinced that we have several dozen well adapted varieties of bunch grapes for growing in the different parts of this State. They are long-lived and mostly heavily yielding and can be produced at a minimum cost as compared with the cost of producing other fruits in the State. Many of these grapes have been classed by leading grape experts of the country as ranking with the best flavored grapes grown. Their connection with the wild grapes of the South gives them a flavor distinctly their own. About a half million new plants are being produced at this time in this State for next season's planting. We feel that this, in itself, should speak volumes for the grape industry in this State, which should rank as not only among the first of the fruit industries of this State, but among the first in the nation.

# Home Fruit Gardens

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Chas. S. Emerson, Jacksonville.

Home fruit gardens are practical insurance to the family. If they are developed to their capacity they will supply the family table throughout the year. From the home fruit and vegetable garden the table is supplied with fresh delicacies and substantial food products most of the year; good preserves, jellies and canned goods are provided for the balance of the year; and enough can be sold to purchase the rest of the things consumed by the family.

I was raised on a hundred acre farm in western Ontario and we had an orchard of several acres in which were apple trees, cherry trees, plum trees, peach trees, pear trees and crab apple trees.

In the garden we had strawberries, gooseberries, currants and raspberries, besides most of the vegetables. In that cold country we could not raise many of the things we can in Florida, but my mother always had 150 to 200 jars of preserves, jellies, jams and pickles, which tasted mighty good when the ground was covered with several feet of snow from November until April.

In Florida the model home fruit garden will produce some fresh fruits nearly every month in the year, and Miss Part-

ridge has told you how to supply your wants if the fresh fruit gives out.

With the finest oranges and grapefruit in the world, which can be obtained from the trees from October until May; with strawberries from November until June; with pineapples from May until November; with watermelons, cantaloupes, pears, plums, peaches, figs, guavas, avocado pears, persimmons, mangoes, grapes and several other varieties of fruits maturing at various seasons, every farmer and fruit grower in the State should raise a supply sufficient to load his own table with the finest health-giving products and to sell enough to pay for flour at twenty dollars a barrel, sugar at forty cents a pound and the other staples that are necessary, instead of confining his efforts strictly to marketing crops and then going to the grocery and buying quantities of canned goods.

That's where the insurance feature comes in. If the market crop fails—and they have been known to do that little thing—the living of the family is still assured from the home garden and all members of the family are better in health and they will all enjoy the work in the garden, but more particularly will they enjoy the delicious products from the Home Fruit Garden.



# Annual Reports

## REPORT OF AUDITING COMMITTEE.

We, the undersigned, your Auditing Committee, beg to report that we have carefully examined the books of the Sec-

retary and the Treasurer, finding them correct.

JASPER C. CARTER, *Chairman*.  
W. W. YOTHERS.

## REPORT OF SECRETARY.

Cash Account to May 6, 1920.

### Receipts

Receipt from membership fees, interest on bank deposit and sales of back proceedings ----- \$1,685.42

### Expenditures

21 bills, totaling ----- \$ 457.00  
To Treasurer ----- 1,228.42—\$1,685.42

### Membership to Date

Honorary members -----	3
Patrons -----	21
Life members -----	136
Perennial members -----	2
Annual members to date -----	1,187
Annual members not reported -----	40
Total -----	1,389

Total membership 1919 ----- 1,373

Estimated attendance at the Ocala meeting 406

## REPORT OF TREASURER.

### Receipts

1919	
May 8—To balance on hand-----	\$ 994.24
1920	
Feb. 17—Wm. Allan's fee -----	1.00
Feb. 26—Sec. Floyd -----	46.90
Apr. 23—Mrs. M. R. Mendells fee ----	1.00
May 4—Bank interest past year ----	19.35
May 6—Sec. Floyd -----	1,228.42
	<hr/>
	\$2,290.91

### Credits

1919	
July 10—By stenographer's bill -----	\$ 84.44
July 26—Sec. Floyd, salary -----	100.00
Aug. 27—Florida Grower Pub. Co. ----	71.35
Aug. 29—Postage stamps -----	1.00
Dec. 15—E. O. Painter Printing Co. --	300.00
1920	
Jan. 24—E. O. Painter Printing Co.---	584.39
May 6—Balance in treasury -----	1,149.73
	<hr/>
	\$2,290.91

W. S. HART, *Treasurer*.

## REPORT OF THE EXECUTIVE COMMITTEE.

Meeting Feb. 9, 1920.

The Executive Committee of the Society held its Annual Spring Meeting in the office of President Hume at Jacksonville, Florida, on February 9,

1920. The meeting was called to order at 11:00 a. m., there being present Messrs. Hume, Rolfs, Niles and Floyd.

After much discussion the dates for the holding of the 33rd annual meeting at

Ocala, Florida, were set for May, 4-5-6 and 7. An amendment to article 2 of the Constitution was discussed and the Secretary was instructed to prepare such an amendment and submit to the committee for action at its next meeting. The need for a new by-law, was also discussed and the Secretary was instructed to prepare one for presentation to the committee for their consideration at the next meeting.

After discussion it was decided that owing to the great cost of printing that it would be necessary to discontinue the publication of the Quarterly and to print only an annual publication.

The Secretary was instructed to make the temporary arrangements for the 33rd annual meeting of the Society. The program for the 33rd annual meeting was discussed in detail. The Secretary was instructed to proceed with the necessary advertisement of the meeting and to conduct the usual membership campaign.

There being no further business the committee adjourned.

#### Meeting May 6, 1920

The Executive Committee of the Florida State Horticultural Society held a meeting in the Harrington Hall, Ocala on the morning of May 6, 1920 at 9:00 a. m. The following members were present: Messrs. Hume, Rolfs, Niles, Hart and Floyd.

The minutes of the February meeting were read and approved. The program for the meeting of the Society on May 6 was discussed in detail. A motion was adopted instructing the Secretary to secure bids and let the contract for the printing of the Proceedings of the 33rd annual meeting in numbers of 100 in excess of the actual membership at time of going to press.

A resolution was adopted recommending that the Society amend Article 2, of the Constitution and adopt By-Law No. 4. There being no further business the committee adjourned.

## Report of Legislative Committee

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Mr. Hume: Next we should have the report of the Committee on Legislation, by the chairman of the committee, but I will read instead a telegram from Mr. Gillett, the chairman, from Honolulu in which he says: "Greetings to the Society from 5,000 miles away. Sorry to miss the meeting. Citrus here practically ruined and avocados, mangoes seriously menaced by Mediterranean Fruit Fly. Urge Society advocate strict inspection or better still absolute quarantine against all foreign fruits.

I know that what Mr. Gillette has wired from Hawaii is not exaggerated. Now we have a quarantine service in this State that is a pretty good quarantine service. It is not as good as it ought to be, and in saying that I am making no

reflection whatever upon the men who are handling it—quite to the contrary. But I do know, under present conditions, that those men have got more to handle than they can properly take care of. Florida has got about as much sea coast as all the eastern United States, a long strip of unprotected coast line. And anybody who knows the situation as it exists in foreign countries cannot realize the danger that we constantly live in, of the introduction of one of seven very serious and very dangerous insects, which have played havoc and in many cases absolutely put out of existence the fruit industries in those sections, and the only thing that stands between us and those same insects is our quarantine service.



# Resolutions

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## AMENDMENT TO CONSTITUTION.

Mr. Hume: There is a matter at this time, while we are on this matter of Resolutions and miscellaneous business that I think I had better bring up, and there are more in the audience than we may get together at a subsequent meeting.

At a meeting of the Executive Committee this afternoon, the very vital question of the future of this Society from a financial standpoint was gone into very carefully. We have had the matter under consideration for some time, but finally decided what line of action the Executive Committee should present to the Society at this time. Now the recommendations of the Executive Committee to the Society takes the form of amendments to our Constitution and to our By-Laws, which under the Constitution, may be amended at any meeting of the Society by a proper vote, of course. Without going into further details of this matter at the present moment, because you don't know what's coming, I am going to ask Mr. Floyd to read these changes and it is the belief of the Executive Committee that these should be put into effect. If you agree with us on that, we will take it up. Mr. Floyd, will you please read those changes?

Mr. Floyd: The Executive Committee recommends that Article 2 of the Constitution be changed to read as follows:

Article 2. Any person may become an Annual member of the Society by subscribing to the Constitution and paying one dollar. Any person may become a Perennial member of the Society by subscribing to the Constitution and paying the annual membership dues five or more years in advance. Any person may become a Life member by subscribing to the Constitution and paying twenty-five dollars. Any person or firm may become a Patron of the Society by subscribing to the Constitution and paying one hundred dollars.

Mr. Hume: I think we had better ask Mr. Floyd to read the balance of it. In addition, the Executive Committee recommends the adoption of another By-Law. There are three By-Laws at the present time. The fourth one would be as follows:

Mr. Floyd: The Executive Committee recommends the adoption of the following By-Law:

4. All Patron and Life membership dues and all donations unless otherwise specified, shall be invested by the Treasurer in United States bonds. Only the interest on these bonds shall be available for payment of the current expenses of the Society. Perennial membership dues shall be placed on deposit at interest by the Treasurer. Only one dollar and the interest from each perennial membership

fee shall be available for use in payment of the current expenses of the Society during any particular year.

Mr. Rolfs: As the resolution originated in the Executive Committee and I happen to be the Chairman, I move the adoption of the amendment of the Constitution.

Mr. Skinner: What would be the objection to making the annual dues \$2?

Mr. Floyd: The chief objection would be on the part of the Secretary in collecting the \$2. It is much easier to get \$1 than \$2.

Mr. Skinner: What is the cost of printing the annual report?

Mr. Floyd: Well that brings up another question. Heretofore we have gone along very nicely, but I hear from the printer that there will be a very substantial increase in cost this year. We have a nice little sum to do this work this year that we hope will take care of it, and if not we will have to raise it by subscription. Then, I believe some of you members will hear from us.

Mr. Christiancy: I suggest that the membership fee remain \$1. and if they want the report to pay another dollar.

Mr. Sample: I think the Secretary can speak better on that point than any one else. It is his duty to raise these dollars, and with a great many people who do not attend the Society, all they want is that copy of the Proceedings. When they pay a dollar for it they think that is all they ought to pay, and at the same time I do not believe we would want a membership to consist of that class of members, we would not want merely a person on our list who had only bought the Proceedings.

We want to encourage them to come to the meetings and it seems to me that your proposition would complicate matters and make it very difficult to put across. I think the simple matter of \$1 for one membership and a copy of the Proceedings would be better, and I believe at the present time that it will not be well to raise the membership fee.

I think the members of the Society could help out by taking perennial membership. The perennial membership provides for paying membership fees five or ten years in advance. In that way the Society has the interest which is small, but when multiplied by one or two hundred, does help out a great deal.

Mr. Hume: Replying to your question Mr. Skinner regarding the Proceedings, it is a very difficult matter for anyone to get at the cost of printing these days. Most any printing establishment will tell you that they will do the printing work if they can and the bill will come in when they get the work done, and the doing of the work will be conditioned upon getting the paper, materials to do it, etc. That is my experience with some printing. I think our Proceedings will cost us in the neighborhood of 80 cents a copy so that it is pretty close figuring to get through.

Mr. Mills: Mr. Chairman, if it costs 80 cents a copy, 20 cents isn't much to run an institution on. Is there any other thing in Florida that hasn't increased in price except the membership of the Horticulture Society? I tell you frankly, it strikes me that if we are in the thing and going to make it worth while, I do not believe anyone interested in the welfare of the Association would refuse to pay \$2. Certainly if you are going to pay 80 cents

a copy, I do not see where there is anything to work on left.

Mr. Sample: We have to have money with which to conduct the Society. I understand that; but you will get better contributions and I believe you will raise your money more easily in some other manner than by adding it to your membership fee. I do not think it would be practicable. This organization is for the mutual good of the growers in the State, and I believe we will get more memberships by leaving it at \$1 than by raising it to \$2, and I believe you could raise your money far more easily by some other method. I am not going to prescribe that method.

Mr. Hart: Mr. Sample has expressed my sentiments in this matter. We want everyone interested in horticulture in the Society; we want them here for what we can get out of them in the way of information, and I do believe that increasing the membership fee—doubling it—would keep a good many away. If you go out after the members to get an increase, you can get a whole lot with \$1; if it is \$2 you would not get near as many. I think it is true in most communities because the high cost of living makes every dollar—though only worth 40 cents or so—count in the considering of the expense of this year and I should feel sorry indeed to see the membership fee increased.

Mr. Hume: Those in favor of the amendment of the Constitution as outlined, will signify by saying aye. Motion is carried and the change in the Constitution is adopted.

Mr. Hume: Now, the additional By-Law, which states how these funds shall

be handled and taken care of. Those in favor of this addition in the way of a fourth By-Law as outlined will signify by saying aye.

Motion is carried and By-Law adopted.

Mr. Hume: Now, then there is a chance for somebody to help us out very materially in the way of becoming Patrons of the Society, by subscribing to the Constitution of the Society and paying \$100. That \$100 becomes as Prof. Rolfs said, a sinking fund and the Society can use the interest on that money only for its expenses from time to time. They cannot touch the principal.

Dr. Ross: I would like to have the pleasure, and I am sure it would be an honor to say that the Florida Citrus Exchange would be the first Patron of this Society. (Applause).

Mr. Hart: Let us understand this thing. There are quite a lot of life members already. Does that mean \$100 from them to become patrons or does it mean \$90.

Mr. Hume: No it means \$100. (Laughter).

Mr. Mills: I have been a life member for some twenty years and this is only the second or third meeting I have attended, but simply to show that my heart is in the right place, and living up to what I preach, Mills the Florist of Jacksonville will be the second Patron.

Mr. Skelly: May I announce that the American Fruit Growers, Inc., will be glad to become a patron member.

Mr. Hart: Mr. Chairman, I want to be the fourth one. I am getting behind.

Chase & Company. I want to be the seventh. I am a seventh son and I would like to become the seventh patron.



Thomas Advertising Service of Jacksonville, the sixth patron.

Mr. Hume: Mr. L. B. Skinner is a very modest man, very retiring. He does not like to talk, and just held up his hand. Make him the eighth.

Mr. Gillett: I want to be No. 13.

Mr. Hume: Well, in order to get close to you Mr. Gillett, we will have to take twelve for the Glen Saint Mary Nurseries Company.

Exchange Supply Company, No. 11.

Mr. Lyons: Mr. Chairman, please make The Gulf Fertilizer Company No. 10.

Florida Grower Publishing Company, No. 9.

The Van Fleet Company, Florence Villa No. 5.

Mr. Christiancy: I was born the 13th day of the month and have been having a terrible time ever since, and I would not like to see this thing left at thirteen, so I am going to make the American Agricultural Chemical Company, Jacksonville, No. 14.

E. O. Painter Fertilizer Company No. 15.

Mr. Floyd: Mr. Chairman, please give Wilson & Toomer Fertilizer Company place No. 16.

Mr. Emerson: I want you to reserve place No. 17 for the Florida Times Union and The Livestock Record.

Deerfield Grove Company, of Wabasso No. 18.

The Southern Crate Manufacturers Association No. 19.

Mr. Hume: If any of the individual members wish to become patrons they can do so.

Hastings Seed Co., Atlanta, Ga., No. 20.

J. C. Schnarr & Co., No. 21.

Mr. Hume: Well, now I think we had better bring this very necessary part of our program to a close. The interest from that fund of \$2,100 will be of very material help to the Society year after year, and I have no doubt that it can be materially increased with a little effort on the part of the officers. Thank you very much.

## No Fence Law

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Mr. Hamner: Mr. Chairman, I desire to offer a resolution to the Florida Horticultural Society.

*"Whereas,* The output of the groves and farms of Florida has now reached the aggregate of more than one hundred and fifteen million dollars annually, and the aggregate value of such farms and groves is approximately one billion dollars; and,

*"Whereas,* The total value of the range stock of Florida is assessed as of the value of only thirty million dollars and the annual output of range animals is five million dollars or less;

*"Whereas,* The owners of range stock are about one per cent of the total population of the State and their range stock is three per cent of the assessed values or less; and the roaming at large of such livestock under the present laws, works a hardship upon the grove and farm owners and makes it necessary for them to build and maintain expensive fences; and such roaming animals, in spite of such fences, do serious damage annually.

*"Therefore, Be it Resolved,* By the Florida State Horticultural Society that

we endorse the platform of the Florida No-Fence League; that the next Legislature be asked to pass a law to submit to the voters of the State by a referendum a proposed law to prevent the roaming at large of livestock, such law to become effective on January 1, 1923, and with the provision that any county or part county may by local option vote, vote itself free range territory if provision is made to protect adjoining territory from depredation by its roaming livestock; and that the passage of such a law will promote progress and development and is for the benefit of the stock at large."

Does the Florida State Horticultural Society endorse the No-Fence legislation? Such law to become effective in January, 1923. I ask that we be put at least upon an equal basis with horse and cattle, and that we be given the right of eminent domain to which we are entitled. (Applause.)

Mr. Sample: Mr. Chairman, I move the adopting of Mr. Hamner's resolution.

Mr. Heimberger: I second the motion. Resolution passed and adopted.

## A Standard for Fruit Maturity

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Capt Rose: I would like to offer a resolution: I have had considerable experience, not as a grower but as a director to a large extent of the shipment of grapefruit, and I can testify to the fact that no mature grapefruit left this State until after the middle of November or probably December; although it began to go out in September it did not mature until December. This Association adopted the standard fixed by a convention of orange growers who unanimously recommended that the Legislature of Florida adopt it, which they did. However, the Florida standard of one to seven for grapefruit and one to eight for oranges has been adopted by the National Associations; it has been adopted by nearly all of our States, and Florida is the only State in the Union that has not adopted the standard fixed by this body.

I prepared this resolution last night and I want to offer it for the consideration of this Association. Individually it makes no difference to me. If it is passed it will take a great deal of labor off my shoulders, as it involves a great deal of labor.

*Whereas*, The Immature Citrus Fruit Law, chapter 6236, Acts of 1911, prohibiting the shipment or sale for shipment of Immature Citrus Fruit, has been held constitutional by the Supreme Court of Florida, and by the United States Su-

preme Court as a proper exercise of the State's constitutional police authority.

*And Whereas*, This Association has approved a standard for mature citrus fruit as presented by a commission appointed by a convention of citrus growers called for the purpose of fixing such standards.

*And Whereas*, The standard so fixed by the citrus growers of Florida has been adopted by the United States Food and Drug officials, by the Association of American Dairy Food and Drug officials, and by numerous States of the Union.

*Therefore be it Resolved*, That the standard fixed by the citrus growers of Florida, and approved by this Association as follows:

"All grapefruit shall be considered to be immature, if the juice does not contain soluble solids equal to, or in excess of, seven parts to each part of acid contained in the juice, the acidity to be calculated as citric acid without water of crystallization.

"All oranges shall be considered to be immature if the juice does not contain soluble solids equal to, or in excess of, eight parts to every part of acid contained in the juice, the acidity to be calculated as citric acid without water of crystallization" be reaffirmed and adopted as the standard of maturity for citrus fruits, by this Association.



*Be it Further Resolved,* That the Legislative committee of this Association be directed to have prepared an act for the purpose of defining immature citrus fruit, grapefruit and oranges, in accordance with the standard as above stated as fixed by the Florida citrus growers, adopted by this Association, by the National Food and Drug officials, by the Association of American Dairy, Food and Drug officials, and by a majority of the States of the Union.

That such law shall fix standards as above quoted, shall also provide for the appointment of four competent, efficient and reliable citrus inspectors, that the inspection season shall extend from September first to December thirtieth of each year; and shall provide for the necessary appropriation for the enforcement of the Act.

Moved and seconded that the resolutions of Capt. Rose be adopted. Motion is carried. Vote is on resolution read by Capt. Rose. The resolution is adopted.

## Final Resolutions

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*Whereas,* The Thirty-third Annual meeting of the Florida State Horticultural Society has now drawn to a close and a most successful meeting commemorates this visit to the birthplace of the Society, therefore be it

*Resolved,* That the Florida State Horticultural Society express to the people of Marion county and Ocala; to the membership of the Marion county Board of Trade; the Ocala Women's Club; the Ocala Rotary Club; to the Ocala newspapers; to Messrs. Louis Chazal, H. L. Borland, and Mr. Logan; and to Mrs. Tydings, Mrs. Gary and to many others who have contributed; its most sincere

appreciation for the great hospitality and friendly aid extended to our members.

There is to Marion county a great stability. Her grand old oaks, her fine farms, beautiful drives, purebred livestock, wonderful groves, her vast lakes and crystal springs portray her beauties and wealth. One who once gazes into the depths of Silver Springs cannot fail to gain from nature enlarged appreciation and understanding.

*Be It Further Resolved,* That this Society express its appreciation to the Jacksonville Times-Union, the Florida Grower, and the other papers of the State, for loyal support and hearty co-operation.

H. S. McLENDON, *Chairman.*

## Election of Officers

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On Thursday evening, May 6, 1920, the following officers were elected for the year beginning January 1, 1921, and continuing to and including December 31, 1921.

PRESIDENT—H. Harold Hume, Glen St. Mary.

FIRST VICE-PRESIDENT—L. B. Skinner, Dunedin.

SECOND VICE-PRESIDENT—S. F. Poole, Winter Haven.

THIRD VICE-PRESIDENT—W. J. Krome, Homestead.

SECRETARY—Bayard F. Floyd, Gainesville.

TREASURER—W. S. Hart, Hawks Park.

EXECUTIVE COMMITTEE—P. H. Rolfs, Gainesville; E. S. Hubbard, Federal Point; L. D. Niles, Lucerne Park.

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## Selection of Next Meeting Place

At the evening session on May 6, 1920, Miami was selected as the meeting place for the Thirty-fourth Annual Session of the Society in 1921. Invitations were received from Lakeland, Daytona, Miami and Gainesville. Spirited speeches were

made by representatives from Miami and Gainesville, but the former won by a big majority. The Gainesville representatives very graciously offered a motion to make the selection unanimous.



# Report of Committee on Necrology

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F. M. O'Byrne, Chairman.

Wars, they say, are breeders of plagues. In this respect the world war of 1914-18 was no exception. In the late summer and fall of 1918 a plague generally called Spanish influenza started at the firing line in France and spread with incredible speed to Spain and thence to all parts of the world. An attack would start innocently enough like a bad cold or lagrippe, but a tremendously large number of the cases would run quickly into pneumonia, and the resulting death rate was appallingly high.

A community would be happy, contented and serene one week, the next would find it in the most deplorable condition with desperate illness in almost every household; schools, theatres and stores all closed; business practically at a standstill.

The country was short of doctors before the plague started, as practically every young and able-bodied physician was at the front or in the base hospitals caring for soldiers. Nurses were very scarce for the same reason. Moreover, when the plague struck a section it was no respecter of persons and incapacitated nurses and doctors indiscriminately.

Conditions were distressing everywhere. So high was the percentage

of sickness that in many cases medical attention or help of any kind was simply not to be had. The death rate was so high, and so many were sick that in many places the dead could not be properly cared for. Many details are entirely too harrowing to be recounted here. In a short time this plague had taken a toll three times as great as that taken by the world war.

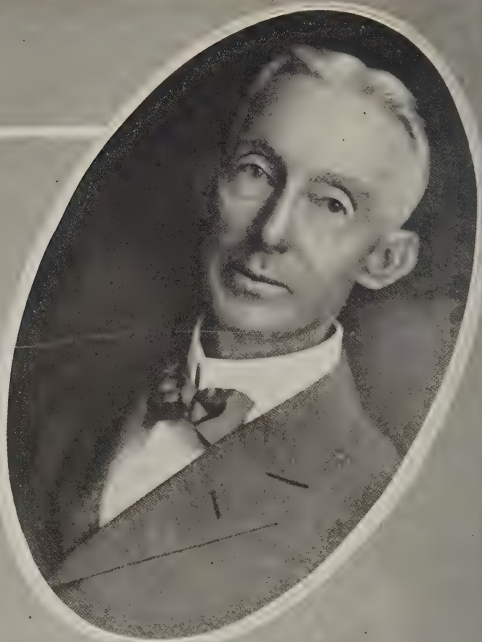
Thanks to the mild climate, Florida did not suffer as badly as most sections of the nation; but at that our loss was severe. During October, November and December a toll of 1,500 lives was exacted in this State. The disease did not reach the State until the latter part of September and within a few months many of our brightest minds, our strongest, most prominent and influential citizens had passed to the great beyond.

The Horticultural Society sustained its share of the loss. At the annual meeting in Orlando it was learned that fifteen members were absent—to meet with us no more. We mourn the loss of some of our most prominent and active members whose places can never be taken—they will forever remain vacant. The Society feels keenly its unprecedented loss. Though they are gone they live with us still in memory.

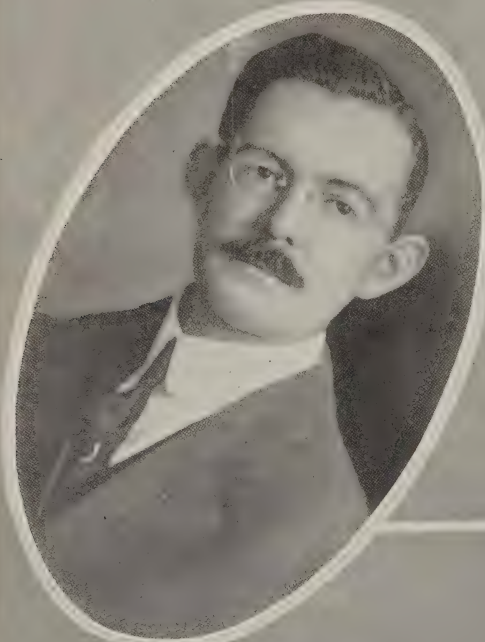




LOUISA A. (MRS. E.S.) HUBBARD  
FEDERAL POINT, FLA.



DR. J. F. CORRIGAN  
ST. LEO, FLA.



JAMES ALLEN STEPHENS  
DE LAND FLA



O.W. CONNER  
LAKE GEM, FLA.



Their precept and example are not forgotten, but will serve a guide to our footsteps; their absence is still keenly felt.

### JAMES ALLEN STEVENS.

On October 6th, 1918, there passed from our midst one of the finest men who ever lived. Mr. J. A. Stevens, of DeLand, was among the first in the State to succumb to the dreaded influenza scourge. It was not realized that he had the influenza until too late. By a peculiar coincidence he passed away on the closing day of the ninth Citrus Seminar as it was he who conceived the idea of the seminar and made it a reality by guaranteeing the required attendance to assure the first meeting.

In Mr. Stevens the State lost a splendid citizen, the Horticultural Society a loyal member, the citrus industry one of the most generally and thoroughly informed of its exponents, his family a bulwark of strength and affection and a host in the State lost a friend and counselor.

Mr. James Allen Stevens was born in Dayton, Ohio, on August 24th, 1877. It was one of the regrets of his life that he was not born in Florida as that was the home of his parents all of their married life. His father, Mr. H. B. Stevens, was one of the pioneer orange growers of the State and at the time of Allen's birth had charge of probably the largest and finest grove of its time. the Bishop-Hoyt Fruit Company's grove at Citra. Allen was literally as well as figuratively raised in an orange grove; as he always intended to make

citrus industry his life work he studied it carefully and thoughtfully from his youth with an exceptionally keen, well balanced and judicial mind.

In 1904 he moved to Jacksonville and went into the fertilizer business with Mr. E. O. Painter. Starting in at the bottom he worked his way to the top. For years he was Mr. Painter's right hand, and one of the best posted men on fertilizers in the State.

After Mr. Painter's death Mr. Stevens became affiliated with the F. M. Leonard Company of Boston, and was manager of its Florida interests at the time of his death. His devotion to duty cost him his life, as he traveled great distances on business while very sick and even delirious with fever.

Mr. Stevens was endowed by nature with an exact and well-balanced mind; he was ever on the search for accurate information. Feeling the lack of technical training it was his custom to visit the Experiment Station and devote his vacation periods to deep and thorough study under the direction of members of the staff. He reciprocated by writing them in detail of the observations he made in the field, by collecting specimens, and by making for them many trips of collection and observation.

He coveted the opportunity for direct instruction by experts for others and made inquiry as to whether a meeting could not be held at the Ex-

periment Station for the instruction of grove owners and others interested in the citrus industry. He was told that the growers wouldn't appreciate and attend such a meeting. He felt sure that they would. Finally he was told that such a meeting would be held if he would guarantee the attendance of a certain number. This he did, and organized the first Citrus Seminar. So popular did the seminar become and so large was the attendance that it soon out-grew the Experiment Station laboratories and is now an important factor in the State. It has grown away considerably from his idea of laboratory instruction, however, and through his efforts the seminar citrus class was organized, which is now the citrus short course.

It was Mr. Stevens who laid the foundation for the very successful field experiments which the Experiment Station has been conducting. Previous efforts at field experimentation had generally failed either because the owner would not give a big enough plot or would interfere with the experiment. Many times a grower has rushed in, picked and sold the fruit on an experimental plot simply because the price was up, altogether unmindful of the fact that the Experiment Station had spent large sums of money and time on the experiment and that he was ruining the results completely. According to such a grower's viewpoint, it was his fruit that was picked and the Experiment Station wouldn't make good his loss if he held the fruit and the price broke. Such a grower

thought that his estimate as to the size and quality of the crop should be sufficient. He did not realize the need of accuracy largely because he did not understand.

Mr. Stevens welcomed field experiments in the many properties under his control. He helped outline the experiments, took the matter of supervision as to details very largely off of the Experiment Station and saw that they were carried out as planned, to the last particular, even to separate picking, grading and packing. His precedent has set a standard for co-operative experiments which will benefit the station forever and bring the scientific and practical worker closer together.

Mr. Stevens was an exponent of non-cultivation and one of the most successful in the State. Many a grove which had never been profitable while being cultivated came out splendidly under his treatment and non-cultivation. He cared for groves on good soil in many parts of the State and was uniformly successful.

Mr. Stevens was one of the most thoroughly posted and all around citrus men in the State. Whether the question was one of insects, diseases, fertilization, culture or packing, he was equally at home. He was conservative and substantial and could always be counted on as one of those whose influence would be on the right side of a question.

His interests were extremely diversified, and it was a constant marvel to see what grasp he had on the details of all of them. He was operating groves

in all parts of the State, organizing packing houses, carrying on spraying and fertilizer experiments in co-operation with the Experiment Station, managing real estate enterprises, and superintendent of his home Sunday school. He had the details of all of the work in these many lines of endeavor at his finger tips and slighted none of them. Time after time he has driven all Saturday night to fill his place in the Sunday school room the next morning. He never spoke unkindly of any one. If he had any suggestions to make to you he made them to your face and in such a way that you could never take offense. He was the best companion one could ask and always the life of the crowd he was in. He had a funny story or remark for every occasion that might arise, to make a point clear, to save an awkward situation or to set some embarrassed individual at his ease.

Mr. Stevens was public-spirited to a fault. He was ready at all times to support or inaugurate undertakings for the public weal and to contribute liberally. During the citrus canker outbreak he prevailed upon his firm to give a large and wholly unsolicited donation for the prosecution of the campaign of eradication, and he personally paid for an infected grove of large seedlings which it was deemed necessary to destroy entirely. In this way he was in no small way personally responsible for the successful outcome of the canker eradication campaign.

But it was in the matter of personal friendship that Mr. Stevens was truly

great. Never has there been a man more sympathetic, more thoughtful of others, more self-effacing. No man in the State had a wider circle of personal friends who looked to him for counsel and encouragement. No matter how harrassed and troubled he might be about his own affairs he was ever ready to lay his problems aside and give a sympathetic and attentive ear to your petty troubles and after thoughtful consideration would give splendid advice backed with common sense; and this regardless of how humble or exalted your station, how trivial or important the matter on which you wished advice.

He is mourned by men in every walk of life, but it is most pathetic in the case of many sturdy men in the humbler stations who had grown through years of close association to lean so heavily on him for advice and suggestions; how heavily they did not realize themselves till he was gone.

His last illness was marked repeatedly by his characteristic thoughtfulness of others. Three days before his death he had his stenographer come to his home and sit on the porch outside of his window while he dictated letters canceling appointments. Though he believed at that time that his illness was to be fatal, he spoke of it in the lightest terms.

Though gone, he is not forgotten. To those of us who knew him intimately he is not dead for he is still a great reality and will live forever in our hearts and recollections. We cannot believe him dead, only away, as ready



and anxious to be of service to us as ever and regretting only that he cannot help us more. He was a true friend, a loving and tender father and husband, a tower of wisdom and strength in the councils of the industry, a man and a gentleman, one of God's noblemen. He is missed indeed.

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### A FRIEND'S TRIBUTE.

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By Rev. Charles L. Collins, D. D., Pastor First Baptist Church, DeLand, Florida.

The writer feels deeply grateful to the chairman of the Committee on Necrology for the request to add a personal tribute to the memory of James Allen Stevens. Others of his friends have known him longer—my acquaintance covers a period of a little less than a dozen years—but none loved him more and none had more intimate acquaintance than was mine. Mine was the rich privilege of being his pastor. But our relations meant even more than that. We were comrades and the closest of friends.

When James Allen Stevens passed away, after his short illness, I realized that one of my choicest friends had gone. With the passing months, I feel more and more deeply that sense of loss. I would that all who knew him might grasp the splendid inspiration given us by the life and character of this manly man. Memories of his life should constitute a bright beacon to call all who knew him on to a higher

and holier service of God and man. Many traits of his appear in bold relief. Let me mention the following:

1. His was a life of usefulness.

Those associated with him in business had learned to depend upon him alike for his excellent judgment and his unfailing loyalty and his constant endeavor. Great business interests were largely in his hands. Florida owes much of her development in recent years to his work of research and experimentation. Leaders of many large projects looked to him for guidance and they did not look in vain. His days were crowded with service.

2. How devoted he was to the best!

The trivial, the transient, the unimportant—these had no charm for him. He had an eye for detail, it is true; indeed, he was a master of detail. But the purely trivial never captured his thought or effort or time. The best in life called him with an imperative appeal and he responded with the best God gave him.

3. How kind and tender a man he was!

Strong in all the strength of real manhood, no mother ever exemplified greater kindness and tenderness than he. All children loved him and, in social gatherings, he was the center of attraction for any gathering in which he was present.

4. And he was actively, genuinely, manifestly, avowedly and gladly a Christian.

I have seen him in just about every relation in life—at work and at play and he did both like a man. I have





MRS. OKLE PAINTER WILLIAMS



been in very intimate contact with him in his home, in counsel with other business men, in his car on long drives, in the grove, on the train, in hotels, in company with superintendents of various properties in which he was interested, in his office, in the Sunday school of which he was the efficient superintendent at the time of his death, at the table of the Lord's Supper where he served as a deacon. I knew Allen Stevens and, everywhere, always, his Christian character shone with the radiance of the noon-day sun.

Two weeks before his death, I was absent from home on a brief vacation. He had in mind some great plans for our Sunday school and wanted to confer with me about them. Rather than have me break into my vacation, he

came, by appointment, a long journey out of his way to see me. That conference was Saturday night and his coming to see me meant that he must travel most of the night to reach home in time to meet his Sunday school next morning. It was my last glimpse of him in the flesh and he was on business for his God.

Indeed, it was always so with him. His Christian life had a large place in all his endeavor. Loyalty to his God dominated his life. I am sure that no mean purpose ever held place in his heart. I count it high honor to have known and loved this man. His memory will always be an inspiration for me. Allen Stevens was a man among men and, in addition, he was a man of God.

### MRS. OKLE PAINTER WILLIAMS.

Mrs. Okle Painter Williams, nee Miss Okle C. Painter, born in Louisville, Ky., July 6th, 1885, died in Jacksonville, Fla., Oct. 15th, 1918.

The brief space of thirty-three years compassed the life of Mrs. Okle Painter Williams. But those thirty-three years were crowded with activities, unusual in their scope and variety, touching as they did every phase of Florida agriculture and horticulture.

Educated at John B. Stetson University, Mrs. Williams entered upon her business career as private secretary to her father, Mr. Edward Okle Painter, and upon his death, May 22d, 1913, succeeded him as president and manager of the E. O. Painter Fertilizer

Company, which position she held until her death. She took a deep and helpful interest in the work of the Girls' Canning Clubs and the Boys' Corn Clubs of Florida, and much of the early enthusiasm awakened in these lines of work were due to her writing efforts and assistance.

For many years Mrs. Williams was very active in the work of the Florida State Horticultural Society, assisting her father when he was secretary and later succeeding him in 1913 as secretary of the Society, which position she held until the meeting of 1917, when she resigned. Mrs. Williams was one of the most regular members in attendance at the annual meetings and con-

tributed, in many ways, her full share toward their success.

On June 30th, 1915, Miss Painter was married to Mr. Simon F. Williams of Jacksonville, Fla., and is survived by her husband, two children—the Misses Okle Painter Williams and Martha Sue Williams, and her mother, Mrs. E. O. Painter.

By all who knew her, and her range

of friendships and acquaintances was wide, Mrs. Williams was respected and honored for her ability, her liberality and her geniality. She was an able business woman, but those who knew her best would remember her for her kindly heart, her willingness to help others, her desire to leave this world the better for her having lived in it.

### ROBERT DAY HOYT.

A member that we all sadly miss is R. D. Hoyt of Clearwater or Safety Harbor. Mr. Hoyt was a polished and courtly gentleman of the old school. Always correct in dress and etiquette, and a brilliant conversationalist, he was the possessor of a striking personality that made a lasting impression on all who knew him, even on casual acquaintances. He had a wealth of interesting personal experiences and a charming way of recounting them. It was a treat to hear him tell of them. He was a horticulturist of great ability and was always glad to give others freely the benefit of his many years of experience.

Robert Day Hoyt was born in New York City, November 18th, 1857, and died at his home, "Seven Oaks," near Clearwater, Florida, November 23d, 1918. When about eight years old his parents moved to Madison, New Jersey, where he lived for about ten years. His first trip to Florida was made in 1875 with his father, and they spent some weeks camping out on the St. Johns river, the Ocklawaha and on

Orange Lake. It was while spending the time at Orange Lake that he became acquainted with Mr. F. G. Sampson, an acquaintance which ripened into a friendship which continued through his life.

He continued to come South every winter and spending the time first in Jacksonville and then in Gainesville. These early trips, made while he was still just a boy, were for the purpose of collecting bird skins, as Mr. Hoyt was raised and trained as a taxidermist. While going through the hammocks near Gainesville he found some excellent land on Bivens Arm and decided to go into the vegetable business. He was quite successful and was expanding his operations rapidly till a freeze, which occurred on the 2d of April, 1881, wiped out everything he had. He was just able to pay his debts and in fact had to put up his watch to get the funds with which to leave. A friend had been lauding the Clearwater section, telling him that it was a beautiful section, growing many tropical fruits and that it was free from frost. As

frost had been his undoing, he decided to go to Clearwater.

To reach Clearwater he had to go to Cedar Keys by rail and from there on by boat. The boat landed at old Fort Harrison, where Harbor Oaks now stands. Clearwater at that time was very small with but one store and one private dwelling where strangers could stop, which served as a hotel.

Mr. Hoyt got his start at Clearwater the first winter he was there by raising a crop of winter vegetables (the first grown in that section) on shares with Capt. Jim McMullen. The crop netted a considerable sum of money, so that Mr. Hoyt and Capt. McMullen were both well satisfied with the season's venture. They demonstrated that vegetables could be grown in Pinellas county successfully, in the winter and, what was more to the point, could be shipped to the northern markets, profitably, even with the then slow means of transportation. Mr. Hoyt, with his share of the returns, married at Clearwater on June 6, 1882, and soon afterward bought a piece of property which he considered the best in that section, on Tampa Bay, about six miles from Clearwater. He built a good house and started a grove and kept adding to and improving both till his death.

Those were real pioneer days. There was no railroad in the State south of Cedar Keys and the only means of transportation was by sailing vessel from Clearwater. Mail was received but twice a week and the country was very sparsely settled. Mr. Hoyt's father named his son's new

property "Seven Oaks," from the seven fine live oaks growing around the house. A small settlement grew up in the neighborhood and the postoffice of Seven Oaks was established, Mr. Hoyt acting as postmaster for many years.

Mr. Hoyt established a large nursery and florist business at Seven Oaks under the name of the Bay View Nurseries. He grew a tremendous number of tropical and sub-tropical indigenous and exotic plants. His business grew until it was one of the largest in the State and had many foreign connections. During this time he developed a great fondness for the Reasoner brothers. Mr. Reasoner and Mr. Hoyt were fast friends to the last. The disastrous freeze of 1894-5 forced him permanently out of the nursery business.

A year before the freeze he received a request for quotations on dried palmetto leaves from a German firm. He had not been interested at that time, but when the freeze ruined the groves and almost everybody in that section he thought of it again. He took the matter up with them and got orders for all the dried palmetto leaves he could deliver. He had a large force of men in his employ, who were depending on him for work. Most people in the State were ruined and had to abandon their groves because they had no means of livelihood while bringing their groves back. Mr. Hoyt, however, was able to employ all his working men and many others in that vicinity at good wages, gathering and drying palmetto leaves for this firm in Hamburg, Germany. In this way he



greatly aided that entire section to re-establish itself and furnish a good living to many who otherwise would have been entirely destitute. These palmetto leaves were used by this German firm to manufacture artificial palms. During a few years following the freeze Mr. Hoyt sold many thousands of dollars worth of these leaves. He continued the work for several years until the community had recovered to the extent that the labor necessary was difficult to secure. It was a God send to the people in that vicinity during the trying years following the freeze.

Mr. Hoyt was a wonderful taxidermist and held a State permit to hunt

rare birds and animals to mount for museums, in which work he was very successful. Mr. Hoyt's collection was the start of the museum at the University of Florida at Gainesville.

His horticultural work was a lifelong passion and he was a successful grower much beyond the average, his fruit being of superior quality and in considerable variety.

In his large nursery work he mingled with others in the trade and was always ready to do his part (or more) in any uplift or co-operative movement. Mrs. Hoyt, Capt. Robert Hoyt, Lieut. Henry Hoyt and Misses Elsie and Clarine Hoyt survive him.

### LOUISA A. HUBBARD.

One of the sad yet pleasant hours spent during each meeting of the State Horticultural Society is when we turn aside from technical papers and discussions to pay a slight tribute to those of our number who have passed into the Great Beyond during the year. It is sad to realize that they are no longer with us, yet we recall with pleasure the many good hours spent together at these meetings, the value of such association, and the privilege of calling them friends.

During the year 1916-17, we were grieved to part with ten of our number, but this year the grim reaper has cut down an even larger number. No one will be more missed than our friend, Mrs. E. S. Hubbard. Of her we can truly say, her heart was with the Society, and when attending the meetings

she was rarely absent from a session.

We have listened to her good talks from the platform, but what to many of us will ever be a cherished memory was her always ready response to our informal talks between sessions, and to our many inquiries in regard to ornamentals suited to Florida conditions. She was an authority on this subject, and was always glad to pass along information to others. She has told us of the Madam Lambard, Cecil Bruner and Duchess de Brabant as roses that will continue to give fine buds and flowers during the entire year, and that the thrip, that inveterate rose pest, has little taste for these varieties.

As a Society, we miss her; as personal friends, we miss her—and how much greater is the loss to those who knew and loved her better. Of her it

can truly be said, "None knew her but to love her, none named her but to praise."

Louisa A. Hubbard, wife of Edwin S. Hubbard, died peacefully July 23, 1918, at Federal Point, Florida, a victim of cerebral paralysis, which in its last phase of twenty months duration left her mentally helpless from loss of memory.

Mrs. Hubbard was a daughter of Benjamin H. Hart, a noted orchardist, living near Poughkeepsie, N. Y., who, in the winter of 1866-7 came to Florida with three of his sons, Edmund H., Walter N., and Ambrose B., and purchasing land in the wilderness at Federal point began orange growing. Mrs. Hubbard, with her mother and younger sister, came to Federal Point the next winter and missed hardly a winter in Florida till the time of her death.

October 11th, 1882, she married Edwin S. Hubbard and is survived by her husband and two children, Edith

Louisa and Edwin Stuart. Growing up in a family of four brothers and three sisters she passed a happy childhood and through breeding, education and social connections developed that rare trait of personality called charm. She was a musician with a well trained voice, and a botanist who had a large acquaintance with the flora of Florida. A member of the Florida State Horticultural Society for many years, she served on the Committee of Ornaments and contributed valuable reports.

A member of the Protestant Episcopal church from childhood, she was a constant and earnest worker in choir and Sunday school and was prominent in all meritorious social work in her home town. Beloved by all, she has left a void that will be felt for many years and memories that will last as long as all that knew her shall live. "Blessed are the pure in heart for they shall see God."

### DR. JOSEPH FELIX CORRIGAN, 1846-1918.

Joseph Felix Corrigan, M.D., was born in Newark, New Jersey, November 19th, 1846. A native of Kells, County Meath, Ireland, his father, Thomas, son of Philip Corrigan and Anne Carroll, emigrating in 1828 at the age of twenty-nine, settled in Newark, N. J., where for a time he followed the trade of a cabinet maker—a trade in which he had served an indentured apprenticeship in Dublin. Mary, the mother of Doctor Corrigan, was one of six children, the offspring of Eleanor

Hoey and of Thomas English, of Kingscourt in the County of Cavan. The Hoeyes were Catholics, while the Englishes were Presbyterians. a brother of Thomas being a minister of that denomination.

There were nine children born of this union—eight boys and one girl. Dr. Corrigan was the seventh child. The only daughter, Catherine, died in an Augustinian Convent. Of the boys three became priests—James, rector of Seton Hall College; George, rector of



St. Joseph's church, Newark, N. J., and Michael, who subsequently became archbishop of New York City. The other boys died young.

Fairly well educated for their day, father and mother were gifted with that love of learning which, implanted by nature in the soul of their race, has through all the centuries of trial been nurtured by the traditions of a famous past if not by the hope of a more famous future. Therefore they spared no means at their hands to give to all their children the most liberal education.

Having finished the common schools in Newark, young Joseph was sent to Mt. St. Mary's College, Emmitsburg, Maryland. From this school he graduated in the year 1865 with the degree of Bachelor of Arts. Subsequently this same college in the year 1867 conferred upon him the degree of A.M.; in 1883 that of Doctor of Philosophy, and in 1917 that of D.D.

After his graduation from the Mount he entered the College of Physicians and Surgeons, Columbia University, New York City. In 1871 he obtained his degree of Doctor of Medicine and was at once appointed head of the House Physicians of Bellevue Hospital. This position he resigned in 1873 to get married. His wife, Marie Emily Plunkett, of South Orange, New Jersey, was the daughter of Mr. Plunkett of the then well known banking firm of Kelly & Plunkett. She was considered the handsomest woman of her day.

After his marriage he returned to his native city and practiced medicine until

1879. About this time there were wonderful reports reaching this country about the success a certain French doctor was having in curing his cancerous patients. Ever alert to learn things whereby the ills of humanity might be relieved, the young physician had no rest until his wife agreed to move to Paris, where he might learn at first hand the method pursued in fighting carcinoma, that most deadly of infirmities to which human flesh is heir. He spent two years in Paris, after which he returned to the United States and again took up the practice of medicine. He had a large practice and his services were demanded night and day. He never spared himself, and so it came that in 1883 his health became so enfeebled that he had to retire from the field. His wife's health was none of the best either. So closing their home, they moved to Texas, and for a while tried life on the ranches. But this was too strenuous and so they had to go elsewhere.

By this time the tourists from the North began seeking the balmy clime of Florida. After having visited almost every section, he finally camped on the banks of Lake Jovita, Pasco county, Florida. The wife was so well pleased with the scenery and the surrounding country that she at once began to feel better and declared to the husband that she had at last found what she had been looking for. Accordingly this site—forty acres—was bought of the owner, Col. Weaver, for one hundred dollars per acre, a high price in those days. At once he began



contemplating the erection of suitable buildings. The nearest railroad point in those days, was at Wildwood. So all the timber that entered into his buildings had to be hauled in wagons from Tampa, Florida. But in 1884 the structures were far enough advanced for housing the whole family.

Citrus fruit culture and farming generally appealed deeply to the beauty-loving nature of Doctor Corrigan, and so he began planting the grove which ever since has been the pride and the glory of Pasco county. He had great faith in Florida and he proved his faith by the expenditure of great sums of money in various experiments. He was the first successful tobacco grower in South Florida and he produced a leaf that brought the highest prices in the markets. Owing to his signal success others were encouraged to enter the same field of production, so that at the present time the annual yield of tobacco in the county is measured by thousands and thousands of pounds.

Dr. Corrigan was a most perfect gentleman because he united in his person all the energy of the North with the typical and well known courtesy, gentleness and consideration of the world-famed Southerner. His home was ever the rendezvous of people from all over the United States. No matter how busy, he was always glad to entertain and to give to all enquirers the information they were after. Whether of high or low degree, all were treated with the same uniform kindness.

He was a lover of youth and his happiest days were those when the boys of the nearby St. Leo College were permitted to spend the day with him. Then, all that he had was at their disposal, his house, his larder, his fruit, his horses and canoes and fishing tackle were theirs for the asking. When they were ill he lavished upon them the best of care, never accepting the slightest compensation. Old students the world over will never forget how carefully and gently he bound up their wounds, set their sprained or broken limbs, or administered to their other bodily ailments.

It was a peculiar distinction of Dr. Corrigan that he always seemed young and at the same time seeming to be mature. He was young in the freshness and vigor of his sentiments, in the innocence and the purity of all his emotions and in his appreciation of and fondness for the natural world around him: a disposition which he always kept thoroughly in check so that it would not master him. There was a sort of child-like innocence, simplicity and a lack of self-consciousness, which contributed strongly to the impression of permanent youthfulness of nature which was always obtained by those who saw much of him.

He was most charitable in his opinion of men. He never allowed differences of matters of belief or opinion to become grounds of personal quarrels. "If," he was wont to say, "if a man did not consider his beliefs on any subject the best in the world he should change

them. Whilst he held them it was evident that he believed them to be the best: and if they were the best, then any contrary opinions must necessarily be inferior. No man quarrels with his neighbor because he has inferior horses, or houses or clothes: but he may quarrel with him if he has some doubt about their inferiority. So he said, it is with opinions. No man who is quite sure of his own beliefs ever quarrels with a neighbor for differing from him. Ill temper in a discussion betrays the doubts about the soundness of his own beliefs."

The death of his beloved wife in 1903 was a blow from which he never fully rallied. Though as ever still gentle and forebearing, there was a certain sadness in his manner that he could not conceal. At the bare mention of the deceased's name his eyes would fill with tears. Yet he would live for his children, and until they had been provided for, he was contented to remain to labor for their welfare. In the spring of 1918 his health became so poor that his children insisted upon his consulting the best of medical skill in New York City. The physicians gave him little hopes, though they tried their upmost to prolong his precious life. He continued under their treatment till the late fall of the same year, when his own knowledge of medicine convinced him that his end was nigh.

His heart was in Florida and so he insisted that he be removed to his dear old adopted home so that he might die in the midst of the scenes he had loved so well and surrounded by his children, whom he had cherished all his life.

Accompanied by his favorite daughter, Catherine, and a trained nurse, he reached St. Leo without any mishap. For a time it seemed that he would recover, because he appeared so bright and happy after his arrival home. But he knew that his end was near and made every preparation for same. On the night of November 28th, surrounded by his weeping children, he surrendered his pure and noble soul into the hands of his Maker.

After the solemn obsequies conducted at St. Leo, the body was shipped to Newark, New Jersey, to be interred in the family vault next to the body of his beloved wife.

He is survived by the Honorable Joseph E. Corrigan, municipal judge in the city of New York; Marie, a Madame of the Sacret Heart Convent, Manhattanville, New York; Catherine, of San Francisco, California; Margaret and George, Mrs. Thomas Thompson of St. Leo, Florida, and Mrs. Eleanor C. West, U. S. Army Nurse Corps, Honolulu.

None knew thee but to love thee,  
None named thee but to praise.

**MRS. POTTER PALMER.**

Mrs. Palmer was born in Louisville, Kentucky, in May, 1849; but spent her youth in Chicago, where her father (Mr. Honore) moved early in the fifties.

She was educated at the "Visitation Convent," at Georgetown (near Washington, D. C.), graduating head of her class at that institution.

At the age of 21, she married Mr. Potter Palmer, of Chicago. There they lived—developing that city for many years, taking an intense interest in the enriching and beautifying of their home metropolis with wholehearted zeal.

In 1893, the World's Fair having formed a "woman's board," Mrs. Palmer was elected to its presidency. During this time she did much good work, both national and international, in the cause of womanhood.

Later she was named by the American Government to represent the women of America at the French International Exposition, and since those days Mrs. Palmer had kept a home abroad, as well as her old one in the United States. She had always travelled much, and her houses were filled with the treasures she collected and studied.

In 1909, she made a first trip to the

Florida West Coast, and was so enchanted with its beauty and the great future she foresaw for it, that she at once began to buy property—groves of citrus trees, cattle and muck lands, farms and turpentine tracts—and she built herself a charming home with surrounding gardens and park, at "Osprey Point." As time passed, this became her favorite residence, and she spent more and more months of each year in the South. Always actively engaged in improving and developing the interests of her new residence, she also gave her powers more and more to solving the problems incident to the opening up of this part of the State, and continued to view the progress of Sarasota and its environment with intense satisfaction, and belief in its capacity.

During the last illness she chose to remain here constantly, and her best days were spent in quiet pleasure in the beauty she could still look out upon from her balcony. The wonderful collection of rare plants and flowers, and the many birds which were encouraged to live in her gardens, bloomed and sang for her until the end; and it was with complete peace of mind, as well as peace about her, that on Sunday, May 4th, 1918, their gentle owner passed calmly away.

**O. W. CONNOR.**

It has been delegated to me, his friend, to undertake the task of writing his obituary, a task undertaken with but little confidence that I can do the

subject justice, but with a cheerfulness tempered by sadness. I little expected that this work would ever fall to me, as those of you who knew him appreci-



ate what a fine up-standing, strong-looking man he was. It indeed seemed as though he would be one of the last of us to go.

To those who knew him but slightly, O. W. Connor was merely the nurseryman, called by many one of the leading citrus experts of Florida. Mr. Connor was not a college bred man, all of his knowledge of citrus culture being learned in the school of experience. I believe that Mr. Connor was one of the very first to recognize the value of bud selection, and he, by experiment, satisfied himself that buds taken from trees producing only the best and highest type of fruit made trees that in turn bore heavily of fruit of the same type, while buds taken hap-hazard often made trees that had reverted to the seedling type, or that were poor bearers and that produced a fruit utterly unlike the parent. All of Mr. Connor's claims for budwood selection have been borne out by government men who have been conducting like experiments in California, covering a period of nine years.

Mr. Connor made few close friends. I believe that among the closest was M. E. Gillett. These men were in a sense business rivals, but both were big in body and heart and such natures mutually attract. Mr. Gillett says: "He was a man but little known. He was best loved by those who really knew him. While seemingly a genial, hale fellow to all, it was impossible to know and appreciate his good qualities unless one got closer to him than was possible through a mere superficial ac-

quaintance; you had to get 'under his skin' as it were, to get at the real man. When you had gotten that far you found a great big-hearted fellow who would go further than would most men to help a friend in need or bestow a charity in an unostentatious way, rarely letting one hand know what the other was doing.

"He did one thing that many men are able to do and yet neglect. He provided a trust fund for the education and support of his children, realizing the uncertainty of life and riches. He loved his business and probably no one in the State did more than he in the propagation of choice varieties of citrus fruits. He was a staunch member of the Florida Citrus Exchange and his council was always wise. He believed thoroughly in co-operation and would sacrifice his personal interests at any time for the good of the citrus industry. Florida, and especially citrus Florida, has suffered an almost irreparable loss in the death of our good-hearted, level-headed friend and brother, the late O. W. Connor."

Mr. Connor was born in Walton, Kentucky, October 24th, 1871, coming to Victoria, Florida, when he was 11 years of age. In his youth he worked as day laborer in the groves around Tangerine and as field hand in the local nurseries there. In January, 1899, he went to Ocklawaha, in Marion county, and with Fred Waite, who is now manager of the Manatee Fruit Company of Palmetto, started what was known as the Campbell Nursery, the name afterwards being changed to

that of The Ocklawaha Nurseries. In about a year he bought out Mr. Waite's interests and went into business for himself. Mr. Waite owned the Magnolia Grove at Belleview, Florida, and it contained a very fine strain of Dancy tangerines. It was from here that Mr. Connor secured his budwood for his famous tangerine grove. This was the origin of the Magnolia strain of the Dancy tangerine orange.

In 1902, realizing that Ocklawaha was too far north for a citrus nursery, where the young stock was liable to frequent damage from cold weather, he started his first nursery at Tangerine, in Orange county. Closing out his Ocklawaha nursery by the end of the year he returned to Orange county in 1903 to personally superintend and build up the business, retaining the old name, which by this time was beginning to have something of a reputation.

In his work at Tangerine he built up one of the finest pedigreed groves in Florida, consisting of oranges and grapefruit. This 17-acre grove, while comparatively young and not yet having reached its full bearing capacity,

was sold three years ago for \$20,000 cash.

Exhausting all the available land suitable for nursery at Tangerine, Mr. Connor began buying land in large tracts in the vicinity of Victoria, the section now being known as Lake Gem. Here he added to his nurseries until he had one of the largest exclusive citrus nurseries in the State. He originated such valuable varieties of citrus as the Connor seedless early orange, the Red Valencia late orange, the Connor Prolific grapefruit and Improved Prolific grapefruit.

On September 26th, 1918, Mr. Connor died at the Seminole Hotel at Jacksonville, from double pneumonia, resulting from an attack of influenza. His wife was with him when he died. He is buried at Tangerine with his first wife and daughter. He is survived by his widow and two children.

In Tangerine the fruit trees grow  
In splendid green and row on row.  
They watch above where he does sleep,  
And constant vigil o'er him keep.  
I wish that he could somehow know,  
For in his life he loved them so.

### MUNSEY BARRINGTON CARSON.

Born January 29, 1875, at Fort Meade, Florida, died November 11, 1919, at his home on Crooked Lake, a victim of Spanish influenza.

Munsey Carson's life was a busy and influential one. Born at the Carson

home two miles east of Fort Meade, he removed with his parents in November of 1886 to the new Carson home established on the eastern shore of beautiful Lake Clinch, near the present site of Frostproof. Here, six miles from

the nearest neighbor and 18 miles from the nearest railroad, he grew to manhood.

He was the main stay of the family in times of most severe affliction. Always at his post of duty in sickness and in health. He grew up in the pure atmosphere of a Christian home, from which he never strayed away. He believed in God, the Bible and the Christ life, and shaped his life and purposes by his belief.

### ELFORD DICKERMAN.

Elford Dickerman was born in Mount Carmel, Conn., on the 24th of January, 1834. At the age of 18 he taught in the district schools of the town of Hamden, Conn., and at the close of the year he left his home to visit an uncle in Troy, New York, studied telegraphy, soon became proficient and was sent to Pittsfield, Mass., where he was station agent and telegraph operator for some years. He established many telegraph offices in that State.

At the age of 25 his health became so impaired that he was advised to give up office work and go to Minnesota, which he did. He regained perfect health in a year and a half, "roughing it" in a log cabin at Winnebago.

Returning East he accepted a clerkship in a retail hardware store in New York City, and in a few years he had worked up to the sole ownership of a large business, in which he was engaged for about twenty-five years. In the spring of 1883, he developed pneumonia, which left him so run down that

He and his elder brother formed the firm of J. W. Carson & Brother, which was afterwards changed to Carson Brothers. They planted groves, developed nurseries and dealt in real estate, influencing profoundly the development of the Frostproof section. His name stood for all the elements of true manhood, highest patriotism, steadfastness and conservative citizenship.

he could not withstand the rigors of a northern climate.

Having recovered from nervous collapse in Florida a few years previously, he decided he would endeavor to find a suitable location in this State as a permanent home for himself and family, which consisted of a wife and four little daughters.

After looking about a few months, he was satisfied that Mount Dora was most desirable, because of the high rolling country and beautiful lakes. He bought a grove and set out several others, became intensely interested in citrus culture, and through all the "ups and downs" of the business, he never lost faith.

He loved his home, in the midst of twenty-five acres of large bearing trees, entered into the early improvements of the town with enthusiasm, giving freely of his means and strength. Was on the public school board for fifteen years.

Mr. Dickerman was the first man in this vicinity to purchase a mowing ma-



chine, and make his own hay, after the first year here (1884), he never depended on northern hay for his stock, and felt that the freezes of '94 and '95, though a hard blow for the State, were in the long run a good thing, as people then for the first time discovered the resources of Florida.

He was greatly interested in the State Horticultural Society, fully appreciating its great work.

### EVERETT WILSON BARKWELL.

Everett Wilson Barkwell was born in Chicago, Illinois, August 17th, 1895.

When he was sixteen months old, his father, Dr. Wesley W. Barkwell, found his health so impaired that he decided to retire from his practice and seek health in the mountains of the West, where he died, a few years later. Everett and his mother then removed to Minneapolis, Minn., to make their home with his uncle, Mr. H. E. Fairchild, where he received his early education. He was graduated from the West Side high school, in 1913, and entered the University of Florida in 1914, to prepare himself for horticultural work at Crooked Lake, Fla., where Mr. Fairchild had large interests in orange and grapefruit groves. He assumed charge of these large interests in January, 1918. His knowledge, energy and determination to get results, marked his work from the beginning, and during his short superintendency, he accomplished much.

He, however, enlisted in the U. S.

He was able to take charge of his groves until a few months before he passed away, on the 8th of December, 1918. We feel that our wonderful climate prolonged his life thirty-four years, as his physicians said that he could not survive one New York year.

He leaves to mourn his loss, his devoted wife and three daughters, Mrs. H. M. Allen, Mrs. Adeline D. Acheson and Mrs. M. Marcellus Javens.

Naval Reserves, in June of that year, but owing to the crowded condition of the Officers Training Quarters, on the Municipal Pier, Chicago, where he was assigned, he was placed on the waiting list and was not called for duty until November 16th, five days after the armistice was signed. He reported for duty at once, and went into training at the Great Lakes station, was stricken with influenza the 16th day of December, which rapidly developed into pneumonia, and he died Dec. 21st.

The loss of such a promising young man, just beginning to make his power felt in the horticultural development of his adopted State, is a distinct loss to the Society and to Florida.

He was a member of the S. A. E. Fraternity, also of the Lake Wales Lodge of Free and Accepted Masons; member of Thomas Brown Chapter No. 22, and Commandery No. 15, both of Bartow, as well as member of Egypt Temple of the Mystic Shrine, of Tampa.

**WILLIAM LUCIEN KEPLER.**

Wm. Lucien Kepler came from Eau Claire, Wisconsin, and settled at DeLand. He developed a large citrus grove in the beautiful Lake Winnemissett section east of DeLand, and was one of the leading and most progressive growers in that district. He was always athirst for information and kept abreast of the times, being among the first to adopt new and progressive

methods in fighting insect pests and diseases. As a result his groves were kept in splendid shape.

Mr. Kepler was a solid and substantial citizen, worthy of emulation. He was exceptionally honest and upright, fond of his family and exerted himself to give them every advantage in education, health, etc.

**ALEXANDER FINLAY.**

Alexander Finlay was born on the 16th day of September, 1856, at Montrose, Scotland, and came to the United States in 1894. It was in Scotland that he learned his trade, "making golf clubs," which he followed throughout most of his life. After coming to America he lived in and around New York until 1916, when he moved to Florida and bought an orange grove on Sand lake, at Orange Center, a town in Orange county, where he prospered until his death.

Mr. Finlay possessed many of the Scottish traits, being very thrifty, honest and having great love for his family. In the community where he lived he was a very substantial and progressive citizen, always one of the first

to take up anything that was progressive and tended towards improvement. One of his first acts after coming to Florida was to join the Florida Horticultural Society.

In the fall of 1918 he left for New York and other points in the North on a business trip, and it was while at Pittsburg that he became sick with pneumonia and died on October 29, 1918, four days after taking sick.

Mr. Finlay's loss was keenly felt by all who had been fortunate enough to come in contact with him, and Florida lost a citizen who, while only residing in the State a short time, had made for himself a niche that will be hard to fill.

Mr. Finlay is survived by his wife and six grown children.

**H. S. BUDD.**

H. S. Budd was for many years a member of the Florida Horticultural Society. He died after a protracted illness at his home in Leesburg, on the 10th of August, 1919, at the age of 63.

Mr. Budd was an Englishman by birth, came to Florida in 1884. He settled at Fruitland Park, where he associated himself with the late G. C. Stappylton, and under the firm name of

Stapylton & Co., carried on business as real estate agents and grove owners; later he entered into the banking business in Leesburg, and was the president of the Leesburg State Bank when

he retired in 1907.

He married Miss Gertrude Hubbard, of Corley Island, and she, with two daughters, survive him.

### O. N. GARDNER.

O. N. Gardner was born at Perue, Ohio, June 7, 1852, where he lived until 1875, following the occupation of a farmer. From 1875 until 1911, when he came to Florida, he traveled throughout the Western States spending most of his time in Iowa and California; after spending some time in California he returned to Chicago, where he accepted a position with a railroad, where he worked a short while until ill health forced him to seek a milder climate and he decided to try Florida, where he remained until his death, seven years later.

After coming to Florida Mr. Gard-

ner accepted a position with the Mapes Fertilizer Company, working under Mr. J. R. Tysen, State agent. Mr. Gardner was a conscientious worker, loyal and painstaking in his tasks, and honorable in all his dealings. He represented Mr. Tysen as salesman for the Mapes Fertilizer Co.

Mr. Gardner died at his home in Jacksonville, June 22, 1918, after a lingering illness, and was buried in Evergreen Cemetery, Jacksonville. He left a wife and two grown children to mourn his loss, and in him, Florida lost an honorable and upright citizen.

### DECEASED MEMBERS.

A. D. Cunningham, 421 Olive St., St. Louis, Mo.

Mrs. A. B. O'Hara, Cocoa, Fla.





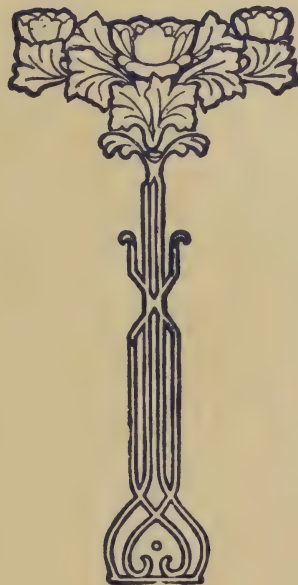






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1921

PROCEEDINGS OF THE  
FLORIDA STATE  
HORTICULTURAL  
SOCIETY *for* 1921



PUBLISHED BY THE SOCIETY









1921 MEETING OF THE FLORIDA STATE HORTICULTURAL SOCIETY, MIAMI, FLORIDA, APRIL 12-15, 1921



# PROCEEDINGS

OF THE

## THIRTY-FOURTH ANNUAL MEETING

OF THE

## FLORIDA STATE HORTICULTURAL SOCIETY

HELD AT

MIAMI, FLA., APRIL 12, 13, 14, 15

1921



PUBLISHED QUARTERLY BY THE SOCIETY  
OFFICE OF PUBLICATION, DE LAND, FLORIDA

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1921

# *Florida State Horticultural Society*

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## OFFICERS ELECT FOR 1921

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### PRESIDENT :

H. HAROLD HUME, Glen St. Mary.

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### VICE-PRESIDENTS :

L. B. SKINNER,  
Dunedin.

W. J. KROME,  
Homestead.

S. F. POOLE,  
Lake Alfred.

---

### SECRETARY :

BAYARD F. FLOYD, Orlando.

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### TREASURER :

W. S. HART, Hawks Park.

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### EXECUTIVE COMMITTEE :

L. D. NILES, Lucerne Park; FRANK STIRLING, Gainesville;  
B. L. HAMNER, Tampa; President, Secretary and Treasurer, ex-officio.

# Constitution

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Article 1. This organization shall be known as The Florida State Horticultural Society, and its object shall be the advancement of Horticulture.

Article 2. Any person may become an annual member of the Society by subscribing to the Constitution and paying one dollar. Any person may become a perennial member of the Society by subscribing to the Constitution and paying the annual dues for five or more years in advance. Any person may become a life member of the Society by subscribing to the Constitution and paying twenty-five dollars. Any person or firm may become a patron of the Society by subscribing to the Constitution and paying one hundred dollars.

Article 3. Its officers shall consist of a President, three Vice-Presidents, Secretary, Treasurer, and Executive Committee of three, who shall be elected by ballot at each annual meeting. After the first election their term of office shall begin on the first day of January following their election.

Article 4. The regular annual meeting of this Society shall be held on the second Tuesday in April, except when otherwise ordered by the Executive Committee.

Article 5. The duties of the President, Vice-President, Secretary and Treasurer shall be such as usually devolve on those officers. The President, Secretary and Treasurer shall be ex-officio members of the Executive Committee.

Article 6. The Executive Committee shall have authority to act for the Society between annual meetings.

Article 7. The Constitution may be amended by a vote of two-thirds of the members present.

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## By-Laws

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1. The Society year shall be co-extensive with the calendar year, and the annual dues of members shall be one dollar.

2. All bills authorized by the Society or its Executive Committee, for its legitimate expenses, shall be paid by the Secretary's draft on the Treasurer, O K'd by the President.

3. The meetings of the Society shall be devoted only to Horticultural topics, from scientific and practical standpoints, and the Presiding Officer shall rule out of order all motions, resolutions and discussions tending to commit the Society to partisan politics or mercantile ventures.

4. All patron and life membership dues and all donations, unless otherwise specified, shall be invested by the Treasurer in United States bonds. Only the interest on these bonds shall be available for payment of the current expenses of the Society. Perennial membership dues shall be placed on deposit at interest by the Treasurer. Only one dollar and the interest from each perennial membership fee shall be available for use in payment of the current expenses of the Society during any particular year.



FLORIDA STATE  
HORTICULTURAL SOCIETY  
QUARTERLY



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Nos 1, 2 and 3

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# List of Members

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## HONORARY MEMBERS

- |  |   |
|--|---|
| Hart, W. S., Hawks Park, Fla.                        | Rolfs, Mrs. P. H., Bello Horizonte, Minas Gaeres, Brazil. |
| Gaitskill, S. H., McIntosh, Fla.                     | Taber, Geo. L., Glen St. Mary, Fla.                       |
| Rolfs, P. H., Bello Horizonte, Minas Gaeres, Brazil. |   |

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## PATRON MEMBERS

### COMPANIES.

- |  |  |
|--|--|
| American Agricultural Chemical Co., Jacksonville, Fla. | Glen St. Mary Nurseries Co., Glen St. Mary, Fla.       |
| American Fruit Growers, Inc., Orlando, Fla.            | Gulf Fertilizer Co., Tampa, Fla.                       |
| Armour Fertilizer Works, Jacksonville, Fla.            | Hillsboro Hotel, Tampa, Fla.                           |
| Buckeye Nurseries, Tampa, Fla.                         | Lake Garfield Nurseries Co., Bartow, Fla.              |
| Chase & Co., Jacksonville, Fla.                        | Mills, The Florist, Jacksonville, Fla.                 |
| Coral Reef Nurseries Co., Homestead, Fla.              | E. O. Painter Fertilizer Co., Jacksonville, Fla.       |
| Deerfield Groves Co., Wabasso, Fla.                    | J. Schnarr & Co., Orlando, Fla.                        |
| Exchange Supply Co., Tampa, Fla.                       | Southern Crate Manufacturers Assn., Jacksonville, Fla. |
| Exotic Gardens, Miami, Fla.                            | Thomas Advertising Service, Jacksonville, Fla.         |
| Florida Citrus Exchange, Tampa, Fla.                   | Van Fleet Co., Winter Haven, Fla.                      |
| Florida Grower Publishing Co., Tampa, Fla.             | Wilson & Toomer Fertilizer Co., Jacksonville, Fla.     |
| M. E. Gillett & Son, Tampa, Fla.                       |  |

### INDIVIDUALS.

- |                                       |  |
|---------------------------------------|--|
| Beach, John B., West Palm Beach, Fla. | Rolfs, P. H., Bello Horizonte, Minas Gaeres, Brazil. |
| Gardner, F. C., Lake Alfred, Fla.     | Skinner, L. B., Dunedin, Fla.                        |
| Hart, W. S., Hawks Park, Fla.         | Williams, S. F., Jacksonville, Fla.                  |
| Hume, H. Harold, Glen St. Mary, Fla.  |  |
| Krome, W. J., Homestead, Fla.         |  |

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## PERENNIAL MEMBERS

- |   |  |
|---|--|
| No. 1.—Adams, F. H., 1921-25, Sutherland, Fla.                        | No. 5.—Gillespie, Earl A., 1920-29, Ozone Park, Queens, New York City, N. Y. |
| No. 3.—Carter, W. S., 1920-24, 901 Guardian Bldg., Cleveland, Ohio.   | No. 6.—Lothian, C. K., 1920-22, care Buckeye Nurseries, Tampa, Fla.          |
| No. 4.—Carter, Thos., 1920-24, care of John Morley, Lake Alfred, Fla. | No. 2.—Mershon, Wm. E., 1921-25, Leesburg, Fla.                              |
| No. 9.—Daspit, P. J., 1921-25, Verdale Nurseries, Houma, La.          | No. 7.—Watson, Rupert J., 1920-24, "Perricoota," Maoma, N. S. W., Australia. |
| No. 8.—Doel, Geo. H., 1921-25, Box 506, St. Cloud, Fla.               |  |

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## LIFE MEMBERS

- |   |  |
|---|--|
| Alderman, A. D., Bartow, Fla.                     | Anderson, Frank K., Citizens Bank Bldg., Tampa, Fla. |
| Allan, Wm., 136 W. 79th St., New York, N. Y.      | Andrews, C. W., John Crerar Library, Chicago, Ill.   |
| Allan, A. W., Avon Park, Fla.                     |  |
| Allan, Mrs. Wm., 136 W. 79th St., New York, N. Y. |  |

- Baltram, Francisco, Monterey, N. L., Mexico.  
 Barber, C. F., Macclenny, Fla.  
 Bardin, A. J. Zolfo, Fla.  
 Bartholomew, Tracy R., 412 Farmington Ave.,  
 Hartford, Conn.  
 Bartlett, A. F., St. Petersburg, Fla.  
 Bartlum, W. Leonard, Fla. Agricultural Supply  
 Co., Drawer 1010-a, Jacksonville, Fla.  
 Beach, John B., West Palm Beach, Fla.  
 Bell, J. D., St. Petersburg, Fla.  
 Berger, E. W., Gainesville, Fla.  
 Berger, Mrs. E. W., Gainesville, Fla.  
 Britt, John J., Eldred, Fla.  
 Carnegie, Mrs. T. M., Fernandina, Fla.  
 Carpenter, G. F., 50 Beck St., Attleboro, Mass.  
 Champlain, A. E., R. F. D. No. 1, Palmetto, Fla.  
 Charles, Rt. Rev. Abbott, St. Leo Abbey, St. Leo,  
 Fla.  
 Chase, Joshua C., Jacksonville, Fla.  
 Chidester, D. D., 446 S. Painter Ave., Whittier,  
 Cal.  
 Christiancy, Cornelius, Port Orange, Fla.  
 Clement, Waldo P., Georgiana, Fla.  
 Clute, F. R., Apartment 1410 M. St., N. W.,  
 Washington, D. C.  
 Conner, W. E., 31 Nassau St., New York City.  
 Conner, Wayne E., New Smyrna, Fla.  
 Cook, R. F. E., Leesburg, Fla.  
 Cornell, H. E., Winter Haven, Fla.  
 Crosby, J. A., San Mateo, Fla.  
 Crutchfield & Woolfolk, Pa. Produce Bldg.,  
 Pittsburgh, Pa.  
 Cunliff, L. H., Norwich, Conn.  
 Doty, A. Duane, Macclenny, Fla.  
 Drew, Prof. Wm. L., Winter Haven, Fla.  
 Edwards, Wm., Zellwood, Fla.  
 Ellsworth, W. J., Blanton, Fla.  
 Fairchild, David, Bureau of Plant Industry,  
 Washington, D. C.  
 Francis, Chas. Jr., Interlachen, Fla.  
 Frink, Aubrey, Berlin, Fla.  
 Fugazzi, John, care of Fugazzi Bros., Cincinnati,  
 Ohio.  
 Gifford, John, Coconut Grove, Fla.  
 Gillett, M. E., Tampa, Fla.  
 Gillett, D. C., Tampa, Fla.  
 Gossard, Prof. H. A., Experiment Station, Woos-  
 ter, Ohio.  
 Gushee, E. G., 2830 W Lehigh Ave., Philadelphia,  
 Pa.  
 Haden, Mrs. Florence P., Coconut Grove, Fla.  
 Hakes, L. A., Winter Park, Fla.  
 Hastings, H. G., 16 West Mitchell St., Atlanta,  
 Ga.  
 Hempel, H. A., Gotha, Fla.  
 Henricksen, H. C., Agricultural Exp. Station, San  
 Juan, Porto Rico.  
 Hentz, W. B., Winter Haven, Fla.  
 Herff, B. Von, Room 1516 McCormick Bldg.,  
 Chicago, Ill.  
 Hernandez, Pedro M., 108 Cienfuegcs, San Fer-  
 nando, Cuba.  
 Hill, E. M., Nueva Gerona, Isle of Pines, Cuba.  
 Hollingsworth, G. S., Arcadia, Fla.  
 Hooper, I. A., Orlando, Fla.  
 Hubbard, E. S., Federal Point, Fla.  
 Hume, H. Harold, Glen St. Mary, Fla.  
 Hutchinson, R. H., 51 Front St., New York City,  
 N. Y.  
 Johnston, S. W., DeLand, Fla.  
 Kerr, Dr. Geo., 325 Armstead Ave., Hampton, Va.  
 Krome, W. J., Homestead, Fla.  
 Lassen, H. C., Bean Spray Pump Co., San Jose,  
 California.  
 Lauman, G. N., Ithaca, N. Y.  
 Leonard, George V., Hastings, Fla.  
 Lewis, Dr. Fred D., 188 Franklin St., Buffalo,  
 N. Y.  
 Livingston, Dr. Alfred, Jamestown, New York.  
 Love, Ozor T., 68 Grove St., Plainfield, N. J.  
 Mackay, Alexander, Glencruitten, Oban, Aigyll-  
 shire, Scotland.  
 Marine, Peter, Sneads Island, Fla.  
 Martin, Wm., Sebastian, Fla.  
 McCarty, B. K., Eldred, Fla.  
 McCarty, Mrs. C. T., Eldred, Fla.  
 McCarty, D. T., Ft. Pierce, Fla.  
 Merrick, Geo., Miami, Fla.  
 Merritt, Dr. J. C., Orlando, Fla.  
 Michael, A. B., Wabasso, Fla.  
 Miller, H. K., Monticello, Fla.  
 Mills, C. D., Jacksonville, Fla.  
 Mills, Dr. J. C., Orlando, Fla.  
 Morley, John, Lake Alfred, Fla.  
 Morse, Mrs. S. M., Orange City, Fla.  
 Moseley, A. A., Winter Park, Fla.  
 Moses, Wallace R., W. Palm Beach, Fla.  
 Mote, E. H., Leesburg, Fla.  
 Myer, H. Van W., Coconut Grove, Fla.  
 Nehrling, H., Gotha, Fla.  
 Neville, H. O., Lonja Del Comercio, 542, Havana,  
 Cuba.  
 Niles, L. D., Lucerne Park, Fla.  
 Norvenland Fruit Co., San Juan, Porto Rico.  
 Ogden, W. B., Lemon City, Fla.  
 Ohmer, C. J., W. Palm Beach, Fla.  
 Olsen, Olaf, White City, Fla.

Painter, Mrs. E. O., Jacksonville, Fla.  
 Patton, E. F., Box 573, Dawson, Canada.  
 Pennock, Henry S., Jupiter, Fla.  
 Pike, W. N., Blanton, Fla.  
 Porcher, E. P., Cocoa, Fla.  
 Porcher, Mrs. E. P. Cocoa, Fla.  
 Prange, Mrs. Nettie M. G., Jacksonville, Fla.

Racey, C. H., Jensen, Fla.  
 Radel, Edw. H., 1418 Avenue K, Miami, Fla.  
 Raulerson, L. Ed, Lily, Fla.  
 Ricketson, Mrs. M. C., "Grayfield," Fernandina, Fla.  
 Robinson, M. F., Sanford, Fla.  
 Rolfs, Prof. P. H., Bello Horizonte, State of Minas Geraes, Brazil.  
 Rolfs, Mrs. P. H., Bello Horizonte, State of Minas Geraes, Brazil.

Sample, J. W., Haines City, Fla.  
 Sandlin, A. R., Leesburg, Fla.  
 Sellards, Dr. E. H., Tallahassee, Fla.  
 Shepherd, Louis H., P. O. Box 175, DeLand, Fla.  
 Smith, C. E., Bogwalk, Jamaica.  
 Sneden, W. C., Jensen, Fla.

Snow, G. E., 73 W. Belview Drive, Pasadena, Cal.  
 Stanton, F. W., Dock and Walnut Sts., Philadelphia, Pa.  
 Stevens, Edmund, Verge Alta, Porto Rico.  
 Strauss, J. E., Plant City, Fla.  
 Stuart, L. E., Montemorelos, Mexico.

Temple, Mrs. W. C., Winter Park, Fla.  
 Thomas, Jefferson, Jacksonville, Fla.  
 Towns, Thomas R., Holguin, Cuba.  
 Trelease, Wm., University of Illinois, Urbana, Ill.  
 Trueman, R. B., Jacksonville, Fla.

Waite, F. D., Palmetto, Fla.  
 Wester, P. J., Bureau of Agriculture, Manila, Philippine Islands.  
 White, C. G., Haiku, Maui Island, Hawaii.  
 Williams, E. S., Ft. Pierce, Fla.  
 Wilson, L. A., Jacksonville, Fla.  
 Wirt, E. L., 45 Pearl St., Bartow, Fla.  
 Worcester, C. H., Pomona, Fla.

Yieta, Ferro, Dr. B. E., Havana, Cuba.  
 Yothers, W. W., Orlando, Fla.

## ANNUAL MEMBERS OUT OF THE STATE

Ahern, John J., 810 McKnight Bldg., Minneapolis, Minn.  
 American Fruit Grower, State Lake Bldg., Chicago, Ill.  
 Anderson, L. R., Holly Springs, Miss.  
 Anderson, Robert, 35 W. LaCrosse Ave., Lansdowne, Pa.  
 Andrews, Catherine, 160 Napper St., Lexington, Ky.  
 Angermann, Henry, 1818 Montgall Ave., Kansas City, Mo.  
 Apker, S. R., Highland Park, Mich.  
 Arnold, John W., 15 Cortleigh Blvd., Toronto, Canada.  
 Atkins, R. M., 2345 E. Hill Ave., Cincinnati, O.

Babcock, J. Lyman, care of U. S. Naval School of Pharmacy, Norfolk, Va.  
 Baird, J. H., Galesburg, Ill.  
 Baker, W. C., 209 Ann St., Elgin, Ill.  
 Barnes, W. A., 8903 Birchdale Ave., Cleveland, Ohio.  
 Barnhart, R. P., Ocean Springs, Miss.  
 Bartlett, Merrill, 900 Met. Life Bldg., Minneapolis, Minn.  
 Bateson, Horace, 646 Century Bldg., St. Louis, Mo.  
 Beckwith, Harry, 26 Fern St., New Castle, Pa.  
 Bein, Walter F., 841 42d St., Rock Island, Ill.  
 Bibby, F. F., Tlahualilo, Durango, Mexico.

Blackford, Jas. A., 542 N. Maire St., Decatur, Ill.  
 Bonner, Chas., 133 W. Washington St., Chicago, Ill.  
 Boynton, W. E., 1377 E. 112th St., Cleveland, O.  
 Brennenman, H. J., 1309-15 U. B. Bldg., Dayton, Ohio.  
 Brockman, John, care of Am. Com. and Savings Bank, Davenport, Iowa.  
 Brooks, W. H., 7308 Clinton Ave., Cleveland, O.  
 Brown, Edward, 4923 Fountain Ave., St. Louis, Mo.  
 Bukac, Francis, 350 S. Grand Ave., Pasadena, Cal.

Calvino, Dr. Mario, Estacion E. Agronomica, Santiago de las Vegas, Cuba.  
 Carlson, Lee V., 4931 N. Leavitt St., Chicago, Ill.  
 Carmiencke, Mrs. Julia, care of Mrs. Barnett Phillips, Harrison, N. Y.  
 Chadwick, J. W., Benham, Ky.  
 Chance, Geo. W., 4 S. 15th St., Philadelphia, Pa.  
 Chapin, Lillian, 5418 Kimbark Ave., Chicago, Ill.  
 Childs, Dr. L. H., Flint, Mich.  
 Clark, Richard, 388 Elderts Lane, Brooklyn, N. Y.  
 Clark, W. A., 523 Woodland Ave., Duluth, Minn.  
 Clark, Wm. Edward, 69 Newberry St., Boston, Mass.  
 Cobb, A. W., 2001 N. Perre St., Indianapolis, Ind.  
 Collins, S. H., "Beechhurst," Long Island, N. Y.



- Commander, A., Sta. B, Rt. 2, Box 58 E., New Orleans, La.  
 Compton, Jno. C., Whiting, Ind.  
 Compton, R. O., Whiting, Ind.  
 Connelly, H. B., 53 W. Jackson Blvd., Chicago, Ill.  
 Croswait, L. M., Bloomington, Ill.  
 Curtis, W. T., 1257 25th St., Detroit, Mich.  
 Dahm, Estelle V., Winnetka, Ill.  
 Dalrymple, Chester W., 16 Pleasant St., Wakefield, Mass.  
 Dehlinger, A. J., 3918 Lock St., Latonia Sta., Covington, Ky.  
 Donald, James, 4118 N. Tripp Ave., Chicago, Ill.  
 Doty, Stewart W., 4443 N. Albany Ave., Chicago, Ill.  
 Dreier, W. C., Rio Piedras, Porto Rico.  
 Duerr, G., 758 8th St., Syracuse, N. Y.  
 Dunn, Geo. W., 2536 14th St., N. W., Washington, D. C.  
 Edson, J. T., 686 Ridge St., Newark, N. J.  
 Eikenberry, D. F., R. F. D. 5, Canton, Ohio.  
 Elder, J. H., Fisk, Sask., Canada.  
 Ells, H. A., Edison Park, Chicago, Ill.  
 England, Martha L., 2800 Perrysville Ave., Pittsburgh, Pa.  
 Eutin, Chas. L., care of Central Hotel, Grafton, W. Va.  
 Evans, J. A., Apt. 34, The Savoy, Washington, D. C.  
 Farmer, E. H., McKittrick, Cal.  
 Fechtig, Dr. St. George, 35-37 Madison Ave., New York, N. Y.  
 Fennell, D. D., 1600 Westminster Bldg., 110 S. Dearborn St., Chicago, Ill.  
 Fernald, Allan R., 517 N. Broad St., Elizabeth, N. J.  
 Fielding, Edward B., 1512 Birchwood Ave., Chicago, Ill.  
 Fink, I. M., 70 N. Y. Ave., Youngstown, Ohio.  
 Fisher, Bernard, 13th and Oak Lane, Philadelphia, Pa.  
 Flechsig, Mrs. Curt, 212 E. Main St., Staunton, Ill.  
 Fletcher, H. M., 623 Rose Bldg., Cleveland, O.  
 Flint, Dr. Geo. C., 706 Huntington St., Boston, Mass.  
 Florida Highlands Citrus Cor., 707 Old State Bank Bldg., Evansville, Ind.  
 Flutka, Frank A., 142 Produce Ave., Philadelphia, Pa.  
 Flynt, H. S., care of Sherwin-Williams Co., Philadelphia, Pa.  
 Fowle, Sir Walter Hamilton, care of City Club, Cape Town, South Africa.  
 Gardner, R. H., care of Egbert T. Osborn, East Moriches, Long Island, N. Y.  
 Gill, P. C., Marvel, Alabama.  
 Good, Will H., Tiffin, Ohio.  
 Gorwood, Kennet J., 311 Wall St., Bethlehem, Pa.  
 Green, Payne G., 106 Essex Apts., No. 34 Chestnut St., Philadelphia, Pa.  
 Gribbal, John, 1513 Race St., Philadelphia, Pa.  
 Griffith, W. H., 860 Clinton Ave., Bridgeport, Conn.  
 Grimes, D. W., Agricultural College, Miss.  
 Guffey, Frank M., 117 E. Pearl St., Staunton, Ill.  
 Hahman, Wm., Altoona, Pa.  
 Hale, Chas. E. A., Route A, Box 30, Savannah, Ga.  
 Hall, E. G., 706 Race St., Rockford, Ill.  
 Hammill, J., 71, Russellton, Pa.  
 Hands, C. A., 1834 Race St., Philadelphia, Pa.  
 Hanson, Henry L., Prosper, N. Dak.  
 Harvey, C. M., Excelsior, Minn.  
 Haskell, L. S., 340 Highland Ave., Pittsburgh, Pa.  
 Hastings, W. S., Somers, Conn.  
 Hawkins, Rev. J. M., Decatur, Ga.  
 Haywood, Frank, care of Wing Co., Nissiva, Minn.  
 Helander, Carl, 29 Williams St., Hartford, Conn.  
 Henning, Henry, Mt. Olive Sta., Pittsburgh, Pa.  
 Henry, J., 401 Bank of Nova Scotia Bldg., Vancouver, B. C.  
 Hesselgrave, S. S., Lowry Bldg., St. Paul, Minn.  
 Heuer, Wm., 326 W. Madison St., Chicago, Ill.  
 Higley, W. M., 925 N. Y. Bldg., Minneapolis, Minn.  
 Hobbs, E. W., 441 Church St., Millersburg, Pa.  
 Hocking, J., 106 10th St., Racine, Wis.  
 Hoke, Geo. R., 1517 E. 63d St., Chicago, Ill.  
 Hosford, H. H., Veterans' Home, Napa County, Cal.  
 Hughes, Jno. R., 342 Lincoln Ave., Youngstown, Ohio.  
 Inslee, C. L., 140 Cedar St., New York, N. Y.  
 Irvin, O., Valparaiso, Ind.  
 Jackson, Geo. L., Gold Butte, Montana.  
 Jervy, Huger W., 27 Williams St., New York, N. Y.  
 Johnston, John R., Obrapia, 37½, Havana, Cuba.  
 Jones, Jesse N., care of S. A. L. Ry., Norfolk, Va.  
 Jones, Philip W., Ft. Atkinson, Wis.  
 Jones, Dr. W. D., Devil's Lake, N. Dak.  
 Joslin, Dr. J. H., 816½ Quarrier St., Charleston, W. Va.  
 Junkins, J. C., Grand Bay, Ala.  
 Kasal, 142 Poplar Ave., Hackensack, N. J.  
 Kauffman, E. A., Lancaster, Pa.

- Keller, H. D., Coldwater, Mich.  
 Kendig, John, 1220 Market St., Philadelphia, Pa.  
 Kimbro, B. N., Jacksonville, Texas.  
 Klein, John Allan, Box 264 Camden, N. J.  
 Klotte, H. E., Glendale, Hamilton County, Ohio.  
 Kraemer, O. C., 4923 Alhambra Ave., Govans, Baltimore, Md.
- La Gess, A. J., 6749 Dorchester Ave., Chicago, Ill.  
 Lewis, John, 912 Nat. Bank Bldg., Birmingham, Ala.  
 Ligon, Milton H., 330 W. 21st St., New York, N. Y.  
 Little, H. G., 1105 Cosden Bldg., Tulsa, Okla.  
 Lord, Henry J., Monroe Center, Stepney Depot, Conn.  
 Loudon, Hugh R., Washington Park, Newark, N. J.  
 Loudon, Jas. S., 723 Grain Exchange, Winnipeg, Manitoba.  
 Luckett, Roger W., Lucketts, Va.  
 Lusby, Wm., 2436 Bloom St., Fairmont, Cincinnati, O.
- MacCarthy, H. P., Nueva Gerona, Isle of Pines, Cuba.  
 Macdonald Colin, Grand Bay, Ala.  
 Macmillan Company, 64-66 Fifth St., New York, N. Y.  
 Martin, A. W., Haywood, W. Va.  
 Martin, Dr. W. H., Kokomo, Ind.  
 Mattern, Chas., 142 Beach, 113 St., Rockaway Park, N. Y.  
 McArdle, Edward J., 106 W. 4th St., Cincinnati, Ohio.  
 McCollum, Ross A., Ina, Ill.  
 McCormick, John, 663 Putnam Ave., Brooklyn, N. Y.  
 McDougal, Robert, 319 Postal Tel. Bldg., Chicago, Ill.  
 McGarvey, J. F., 754 Washington Ave., Lorain, Ohio.  
 McKay, H. M., Athens, Ga.  
 McNitt, D. G. F., 710 Main St., Racine, Wis.  
 Menifee, J. C., Sapulpa, Okla.  
 Mergler, C. W., Ridgefield Park, N. J.  
 Meyer, Carl, 2144 Slane Ave., Norwood, Ohio.  
 Meyers, Jacob P., 1002 Beulah Ave., Pueblo, Col.  
 Mill, Julius C., 302 37th St., Milwaukee, Wis.  
 Mitchell, David, 168 Virginia Ave., Jersey City, N. J.  
 Moore, Geo. E., Ironwood, Mich.  
 Morgan, W. V., Box 174 Waycross, Ga.  
 Morrill, Geo. A., Groton, Mass.  
 Morse, Louis W., care of United Paper Co., Atlanta, Ga.  
 Moser, John, Santa Lucia Colony, Nuevitas, Cuba.
- Muller, Paul, 548 Brandywine Ave., Schenectady, N. Y.  
 Myers, E. W., 1402 S. 17th St., St. Joseph, Mo.
- Oberrender, Elliott A., 1503 Franklin Bank Bldg., Philadelphia, Pa.  
 O'Leary, Denis, Queensboro, Douglaston, N. J.  
 Otterman, Wm. A., 772 E. 92d St., Cleveland, O.
- Package Sales Corporation, South Bend, Ind.  
 Parmely, Everett H., Box 301 Lancaster, Pa.  
 Perfield, Thos. H., 41½ W. 45th St., New York, N. Y.  
 Perier, Joseph, 275½ Maple St., Holyoke, Mass.  
 Pierce, Mrs. B. B., 820 Garrison Ave., Ft. Smith, Ark.  
 Putnam, Dudley, 626 Jackson Blvd., Chicago, Ill.
- Quartz, Wm. B., 331 S. Pacific Ave., Pittsburgh, Pa.
- Raymond, T. W., Holly Springs, Miss.  
 Regan, John J., 2405 Lake Isle Blvd., Minneapolis, Minn.  
 Regan, Wm., care of Regan Bakeries, Minneapolis, Minn.  
 Reid, John A., Box J., Alexandria Bay, N. Y.  
 Repp, Albert, Glassboro, N. J.  
 Rexfield, Geo. Polk, Pa.  
 Reynolds, L., 1225 Benton Blvd., Kansas City, Mo.  
 Rico Tropical Fruit Co., Garrochales, P. R.  
 Rowley, E. G., 6018 Morningside Drive, Kansas City, Mo.  
 Ruch, Martin, 1306 Olive St., St. Louis, Mo.
- Schnepp, Wm., Bagota, N. J.  
 Schrader, G. A., 51 Wolcott Ave., Beacon, N. Y.  
 Schraeder, Henry, Saratoga Springs, N. Y.  
 Schwiemann, H. C., Danvers, Ill.  
 Seaton, S. A., 1943 E. 86th St., Cleveland, O.  
 Semple, H., Box 54, Greybull, Wyo.  
 Sherwin, F. E., 1436 S Wisconsin St., Racine, Wis.  
 Schillaber, C. F., Portsmouth, N. H.  
 Sickler, R. P., Audubon, N. J.  
 Skelton, C. W., Box 217, Jersey City, N. J.  
 Skinner, Dr. R. M., Flemingsburg, Ky.  
 Smart, H. P., 1900 Irving Ave. S., Minneapolis, Minn.  
 Smiley, V. S., Box 431, Monessen, Pa.  
 Smith, A. G., Jr., Agricultural College, Miss.  
 Smith, Jas. A., 572 W. 187th St., New York, N. Y.  
 Snider, Ira, 525 Bush St., Owosso, Mich.  
 Snyder, Aaron F., Weissport, Pa.  
 Sparks, O. B., 204 S. 80th St., Birmingham, Ala.  
 Stephens, Geo. E., Kenosha, Wis.  
 Stevens, T. E., 820 World-Herald Bldg., Omaha, Neb.

- Stewart, Mrs. John Wood, 205 W. 13th St., New York, N. Y.  
 Stonebridge, C. H., 23 Warren St., New York, N. Y.  
 Storrs & Harrison Co., Painesville, O.  
 Straley, S. V., Princeton, W. Va.  
 Stretton, J. T., Griggsville, Ill.  
 Swan, J. C., McKinley, Isle of Pines, Cuba.
- Thomson, Samuel G., 125 Riverside Drive, New York, N. Y.  
 Thurng, F. H., 624 Finance Bldg., Kansas City, Mo.  
 Torner, Fred W., Box 65, Marietta, Ohio.  
 Townsend, C. Marot, 450 River St., Hackensack, N. J.  
 Trammell, Lt. Comm. W., U. S. S. Fox, U. S. Naval Forces in Europe, care of Postmaster, New York.  
 Turner, Wm., 2241 Indiana Ave., Chicago, Ill.  
 Turton, Geo. L., 47 Brevort Place, Brooklyn, N. Y.
- Vanderkloot, W. A., 200 N. Scoville Ave., Oak Park, Ill.  
 Van Kleek, John R., 60 Elizabeth St., Auburn, N. Y.  
 Vaughn, J. C., P. O. Drawer "V," Chicago, Ill.
- Walker, N. S. A., 508 N. Leamington Ave., Chicago, Ill.  
 Walker, U. S. A., 5437 Rice St., Chicago, Ill.  
 Watson, C. Roy, Milford, Mich.
- Watts, Alfred Allan, 50 Church St., New York, N. Y.  
 Weber, Harvey C., Evansville, Ind.  
 Wedekemper, Frank J., Kappa Sigma House, Lexington, Ky.  
 Wheaton, W. J., 45 Hoyt Place, Rochester, N. Y.  
 Wheeler, J. H., 92 State St., Boston, Mass.  
 Whipple, Herbert G., 220 Broadway, New York, N. Y.
- Wilder, J. J., Waycross, Ga.  
 Wildey, W. H., Mount Carroll, Ill.  
 Willett, N. L., 849 Broad St., Augusta, Ga.  
 Williams, A. M., Asbury Park, N. J.  
 Williams, A. O., 819 S. Champion Ave., Columbus, O.  
 Willis, Arthur E., Nueva Gerona, Isle of Pines, Cuba.  
 Wilson, Jno. A., 1037 Boatmans Bank Bldg., St. Louis, Mo.  
 Wilson, S. E., Room 938-190 N. State St., Chicago, Ill.  
 Wolfe, Earl A., Fairview, Detroit, Mich.  
 Wolner, Oscar Herbert, Box 502, Elcor, St. Louis County, Minn.  
 Wood, Gar, Algonac, Mich.  
 Woodbury, W. W., Sandwich, Ill.  
 Woodruff, C. T., Elizabeth, N. J.  
 Wyack, Chas. H., 7520 Crandon Ave., Chicago, Ill.
- Yeaton, W. S., Box 41 Hempstead, N. Y.  
 Young, Geo. F., McKinley, Isle of Pines, Cuba.  
 Youngman, Dr. J. A., Sappington, Mo.

## IN THE STATE

- Ackoay, A. Van, 509 N. St., West Palm Beach.  
 Adams, Arthur, Coconut Grove.  
 Adams, B. F., Rt. 1, Box 384, Miami.  
 Adams, B. G., Buffalo & Nebraska, Ave., Tampa.  
 Adams, Dr. Chas. W., Lake Alfred.  
 Adams, E. M., Owanita.  
 Adams, Ira E., 125 N. E. 1st St., Miami.  
 Adkins, J. C., Gainesville.  
 Albrecht, A. C., R. F. D. 1, Homestead.  
 Alexander, J. E., DeLand.  
 Alexander, Manuel, Lake Worth.  
 Alexander, Mrs. Marcus, Box 864, Tampa.  
 Alexander, S. R., DeLand.  
 Alexander, Wm. J., Rt. 1, Box 34, Seffner.  
 Alger, Francis Fr., Eustis.  
 Allen, B. H., Largo.  
 Allen, H. H., Box 402, Eustis.  
 Allen, Miss Louise J., Box 63, Orlando.  
 Allen, Nahum H., 639 Fern St., W. Palm Beach.  
 Allison, H. Dove, Homestead.  
 Allsopp, Henry G., Sebring.  
 Allwood, J., Winter Haven.
- Almond, J. D., Ft. Pierce.  
 Althouse, Geo. H., Homestead.  
 Ambrose, H. T., Winter Haven.  
 Ambrose, H. W., Winter Haven.  
 Ames, W. D., Box 200, Lake Worth.  
 Ammann, John, P. O. Box 393, Orlando.  
 Anderson, A. V., Avon Park.  
 Anderson, C. P., Avon Park.  
 Anderson, Fred, Crescent City.  
 Anderson, Dr. J. G., Gainesville.  
 Anderson, J. P., Haines City.  
 Anderson, W. M., R. F. D. 1, Homestead.  
 Andrew, Alfred, Lutz.  
 Andrews, Dan M., Sebring.  
 Anner, Henry, Georgiana.  
 Anstett, J. F., Orlando.  
 Arlen, Henry, Fellsmere.  
 Artis, Harvey C., Winter Haven.  
 Asher, Peter, Orlando.  
 Ashmore, O. M., Ft. Myers.  
 Aston, Sam V., care of Tropical Fruit Conserving Co., Miami.



- Augustine, H. A., 529 Osceola St., Jacksonville.  
 Archambault, Jos. T., Box 35, Ft. Pierce.  
 Bachman, T. J., Bradentown.  
 Backer, Mrs. Anna K., Little River.  
 Baile, J. C., Miami.  
 Bailey, E. R., Sanibel.  
 Bailey, G. W., Florence Villa.  
 Baird Hardware Co., Gainesville.  
 Baker, Mrs. D. H., R. F. D., Wildwood.  
 Baker, F. T., Indian River City.  
 Baker, L. J., Rt. 1, Box 323, Miami.  
 Baker, Milton, Sebring.  
 Baker, Thomas J., Box 1713, Jacksonville.  
 Bales, Guss, Goulds.  
 Ballard, Agnes, 312 Jefferson Rd., West Palm Beach.  
 Barber, Eppie L., Box 190, Lake Worth.  
 Barber, E. W., R. F. D., Lake Wales.  
 Barber, L. S., Tallahassee.  
 Barnes, C. W., Winter Haven.  
 Barnes, E. A., R. F. D., Homestead.  
 Barney, J. W., Bradentown.  
 Barr, Mrs. Catherine D., Homestead.  
 Barron, A. B., Ft. Myers.  
 Barrows, H. E., Box 31, Lake Worth.  
 Bartholomew, C. E., 418 2d Ave. S. W., Miami.  
 Bartlett, Mrs. C. O., Box 538 R. F. D., Miami.  
 Bartlett, Wright, Ft. Ogden.  
 Barton, J. O., Glen St. Mary.  
 Bass, M. M., Ft. Myers.  
 Bass, C. A., care of State Plant Board, Gainesville.  
 Bassett, E. G., Salerno.  
 Bassett, Mrs. E. G., Salerno.  
 Bassitt, W. L., Inverness.  
 Bayer, J. L., Bartow.  
 Beaty, R. B., Box 125, Tampa.  
 Beaver, Joe F., Key West.  
 Beckwith, W. H., Tampa.  
 Beerhalter, A., Ft. Pierce.  
 Beggs, J. D., Orlando.  
 Bemenderfer, Chas., Ft. Pierce.  
 Bender, Harry G., Eustis.  
 Bennett, B. D., Ocoee.  
 Benson, Fred, Boynton.  
 Benson, Harry, Boynton.  
 Bentz, P. J., Ft. Myers.  
 Berlin, Abe, Gainesville.  
 Berry, Mrs. C. M., Sanford.  
 Berry, Harold D., Box 682, W. Palm Beach.  
 Berno, Ed. M., Box 846, Orlando.  
 Betheuser, F. E., Four-Way Lodge, Cocoanut Grove.  
 Bettler, J. E., Rockledge.  
 Bevers, Mary C., Box 121, Lake Worth.  
 Binney, Edwin, Indrio.  
 Biorseth, C. M., Sarasota.  
 Birley, H. C., Lake City.  
 Bixler, Fred J., Box 764, W. Palm Beach.  
 Bizzell, T. A., DeLand.  
 Blackman, E. V., Miami.  
 Blake, Ellis G., Lake Helen.  
 Blake, Mrs. Ellis G., Lake Helen.  
 Blakely, Wm. P., Ocoee.  
 Blanding, J. W., Ft. Myers.  
 Blaze, Chas., Box 114, Fruitland Park.  
 Bleech, G. A., St. Cloud.  
 Blood, J. P., St. Cloud.  
 Blye, John H., Tavares.  
 Boardman, W. C., care of Tampa Bay Grain Co., St. Petersburg.  
 Bobb, G. F., Sebring.  
 Bobo, Walter, Gifford.  
 Bolles, W. E., Oldsmar.  
 Bollinger, H. D., Box 842, Miami.  
 Bonynge, Edw. W., Mt. Dora.  
 Boone, Mrs. Sarah F., Orlando.  
 Borden, Mrs. J. Wm., Box 77, W. Palm Beach.  
 Bosanquet, Louis P., Fruitland Park.  
 Bostrom, C. E., Ormond Beach.  
 Bostrom, C. G., Ormond Beach.  
 Bostrom, J. A., Ormond Beach.  
 Bosworth, N. C., Fruitland Park.  
 Bourland, H. L., Ocala.  
 Bourland, Mrs. H. L., Ocala.  
 Bourne, H., Orlando.  
 Bower, R. T., Box 126, Gainesville.  
 Bowers, Chas. E., R. F. D. 2, Maitland.  
 Bowers, Thomas L., Miami Beach.  
 Boyatt, F. M., 2114 Leon St., Gainesville.  
 Boyd, A. P., Bradentown.  
 Boyd, Harold J., Clermont.  
 Boyd, Jas. H., Clermont.  
 Boyd, W. Lacy, Bartow.  
 Boyden, B. L., Box 603, Daytona.  
 Boysen, L. L., Pensacola.  
 Bradbury, C. O., Winter Haven.  
 Bradford, W. A., Lakeland.  
 Bradshaw, L. H., Box 265, Delray.  
 Bradshaw, J. H., Orlando.  
 Brady, E. L., 251 N. E. 4th St., Miami.  
 Brammar, Samuel, St. Cloud.  
 Branhaus, A. G., 404 Lucerne Circle, Orlando.  
 Bratley, J. H., Rt. 2, Buena Vista.  
 Bray, J. W., Winter Garden.  
 Brice, J. J., Kendal.  
 Bridge, Edgar, Sebring.  
 Bridges, J. J., Box 1151, Miami.  
 Briggs, W. R., Bradentown.  
 Brigham, F. E., Florence Villa.  
 Brigham, F. L., Florence Villa.  
 Bright, Jas. H., Miami.  
 Brock, W. W. & Son, 16 Real Estate Bldg., Miami.  
 Brokaw, W. H., Orlando.  
 Brooks, Chas. I., R. F. D. 1, Box 630, Miami.  
 Brooks, J. R., East Coast Hotel Co., Palm Beach.  
 Brooks, P. A., 3310 Ocean Front, Miami Beach.  
 Brossier, F. C., Box 457, Miami.

- Brown, Arthur H., Manatee.  
 Brown, A. F., 29 Cypress St., Daytona.  
 Brown, A. C., Gainesville.  
 Brown, C. E., Lucerne Park.  
 Brown, Chas. M., Elfers.  
 Brown, C. Wilbert, Hamilton Lodge, Lake Hamilton.  
 Brown, Miss F. E., Box 842, Miami.  
 Brown, Harry, Evening Telegram, Lakeland.  
 Brown, J. E., 109 Plant Ave., Tampa.  
 Brown, J. E., Maitland.  
 Brown, Jas. M., Hypoluxo.  
 Brown, M. R., Box 842, Miami.  
 Brown, O. D., Elfers.  
 Brown, Vet L., Bartow.  
 Brown, Mrs. Vet L., Bartow.  
 Brownlow, M. J., Homestead.  
 Bruce, G. D., Winter Haven.  
 Bruen, Geo. H., Georgiana.  
 Bruyiere, J., Avon Park.  
 Bryan, R. L., Bartow.  
 Bryan, W. E., Belleair.  
 Bullock, Ralph G., 140 N. E. 1st St., Miami.  
 Buneck, Frank, Eustis.  
 Bunting, N. H., Lake Wales.  
 Burdine, J. M., Miami.  
 Burdine, R. B., Miami.  
 Burkhim, L. J., Gainesville.  
 Burleigh, E. S., Tavares.  
 Burnham, Geo. A., Box 677, Tampa.  
 Burr, E. D. V., care of Armour Fert. Co., Miami.  
 Burroughs, S. J., care of Exchange Supply Co., Tampa.  
 Burton, R. P., Emeraldal.  
 Bush, E. E., Ft. Lauderdale.  
 Buttler, H. V., Lake Alfred.  
 Buttler, Mrs. H. V., Lake Alfred.  
 Butts, Elwyn, Dade City.  
 Butts, W. E., Mt. Dora.  
 Byrd, G. W., Midway.  
 Byrd, J. N., care of Lindsey Tire Co., Miami.  
 Byrd, R. L., Winter Garden.  
 Byron, Edward S., Crooked Lake.  
 Bystra, Henry G., Box 36, Dunnellon.  
 Caballero, Miguel, care Cuban Consul, Miami.  
 Caderstrom, O. H., Groveland.  
 Cadman, W. H. R., Rt. 1, Mich. Ave., Orlando.  
 Caldwell, H. W., Winter Park.  
 Cameron, Mrs. D. F., Leesburg.  
 Campbell, Allen E., Melbourne.  
 Campbell, D. L., Quincy.  
 Campbell, J. O., Box D, Melbourne.  
 Campbell, M. G., Box 97, Lake Wales.  
 Campbell, P. W., Estero.  
 Campbell, S. L., Panama City.  
 Campbell, W. E., Largo.  
 Cannon, Finley, Gainesville.  
 Caravacious, P. G., Sebring.  
 Carey, J. H., Jew Fish.  
 Carlton, Geo. S., Citra.  
 Carlton, Mrs. Geo. S., Citra.  
 Carlton, J. H., Zolfo.  
 Carroll, S. J., Lotus.  
 Carmichael, O. M., Box 608, W. Palm Beach.  
 Carn, W. D., Ocala.  
 Carnes, W. W., Bradentown.  
 Carney, Miss Margaret, E. 318 2d Ave., W. Palm Beach.  
 Caron, Dr. A. E., Lake Worth.  
 Carper, J. A., Dade City.  
 Carrier, W. D., Crooked Lake.  
 Carter, Jasper C., Dade City.  
 Carter, W. J., Box 212, W. Palm Beach.  
 Carter, W. T., 1360 N. E. 1st Ave., Miami.  
 Cartmel, Frank, Box 664, Jacksonville.  
 Caruthers, J. M., Orlando.  
 Caples, Ralph C., Sarasota.  
 Capwell, G. N., Sebring.  
 Casson, A. C., New Port Richey.  
 Cast, W. H., Homestead.  
 Castillo, Toney, 1208 Arch St., West Tampa.  
 Castle, A. C., Perrine.  
 Causey, J. H., Wauchula.  
 Cellon, F. M., Box 301, Lake Worth.  
 Chadwick Brothers, Punta Gorda.  
 Chaffin, Jeff, Gainesville.  
 Chamberlin, E. W., Tangerine.  
 Chamberlayne, J. Hampden, Orlando.  
 Chamberlayne, Mrs. J. Hampden, Orlando.  
 Chambers, A. J., 815 S. Poinsettia Ave., W. Palm Beach.  
 Chandler, L. L., R. F. D. 1, Homestead.  
 Chapman, Mrs. Anne F. J., Port Orange.  
 Chapman, W. A., Box 46, Plymouth.  
 Chase, S. O., Sanford.  
 Chase, W. W., Lakeland.  
 Chazal, Louis H., Ocala.  
 Cheatham, J. Hubbard, Miami.  
 Cheseboro, Henry W., Boca Ratone.  
 Chiles, R. B., Lakeland.  
 Chillingworth, C. C., W. Palm Beach.  
 Chrispin, Jas. G., Leesburg.  
 Christiance, D. F. F., Coconut Grove.  
 Chute, Geo., care of Hilliard Lodge, Crooked Lake.  
 Ciserman, Henry, Glen St. Mary.  
 Clark, Sydney, Rt. A, Miami.  
 Clayton, H. G., Gainesville.  
 Cline, A. E., Altamonte Springs.  
 Cline, Elmer E., Auburndale.  
 Cline, Mrs. Elmer E., Auburndale.  
 Coan, R. C., Keystone Park.  
 Coberly, H. H., R. F. D. 1, Box 241, Tampa.  
 Cocoa Chamber of Commerce, Cocoa.  
 Cocoa House, Cocoa.  
 Codwise, Chas. W., Bonito Springs.  
 Cody, F. L., Frostproof.  
 Cody, J. M., Vero.  
 Coe, M. B., 225 4th St., N., St. Petersburg.

- Coffin, Dr. C. E., Winter Park.  
 Cogswell, N. M., Box 1076, Orlando  
 Colby, Geo. P., Lake Helen.  
 Coleman, Chas., Eau Gallie.  
 Coleman, Geo. D., Lisbon.  
 Coles, C. H. & Son, Gainesville.  
 Collicutt, W. J., R. F. D. 1, Maitland  
 Collins, John S., Miami Beach, Fla.  
 Collins, Paul, Lakeland.  
 Colson, B. R., Gainesville.  
 Colson, Dr. J. H., Gainesville.  
 Combs, W. H., Box 864, Miami.  
 Commander, C. C., Florence Villa.  
 Condry, P. W., Coconut Grove.  
 Conkling, R. A., W. Palm Beach.  
 Conner, D. S., Homestead.  
 Constantine, H. H., Clearwater.  
 Constantine, H. H., Jr., Clearwater.  
 Cood, E. N., Lakeland.  
 Coogle, Geo., Lakeland.  
 Cook, H. L., Homestead.  
 Cook, W. A., Bradentown.  
 Coolidge, J. W., Ft. Pierce.  
 Coon, Wm. R., 818 4th St., N., St. Petersburg.  
 Cooper, Mrs. A. A., Box 694, Mt. Dora.  
 Cope, B. O., Sebring.  
 Corbett, L. G., Box 881, Clearwater.  
 Core, H. R., R. F. D. 1, Homestead  
 Corsa, John, Vero.  
 Cosner, F. D., Dade City.  
 Costello, Mike, Lake Worth.  
 Coult, A. A., 405 Consolidated Bldg., Jacksonville.  
 Coup, Albert A., Box 209, Punta Gorda.  
 Cox, John S., Carlberg Court, W. Palm Beach.  
 Crabb, R. R., Leesburg.  
 Crafton, Bernard, Malabar.  
 Crafton, H. R., Malabar.  
 Craig, R. A., Lucerne Park.  
 Cramer, E. D., 321½ Clematis Ave., W. Palm Beach.  
 Crandall, C. W., Gainesville.  
 Crenshaw, C. J., DeLand.  
 Cressap, R. O., Lakeland.  
 Crews, Harold, Arcadia.  
 Crews, T. A., R. F. D. 3, Wauchula.  
 Crews, W. L., Sebring.  
 Crisp, T. H., Sarasota.  
 Crosby, W. J., Citra.  
 Crumley, J. P., Grand Island.  
 Crystal River Crate Co., Crystal River.  
 Culver, A. L., Boynton.  
 Cunningham, W. W., R. F. D. 1, Homestead.  
 Curlett, E., Geneva.  
 Curry, Mrs. A. P., Orlando.  
 Currie, T. A., Winter Haven.  
 Curry W. R., Lemon City.  
 Cushman, A. E., Box 205, Homestead.  
 Cushman, Lucy C., Tallahassee.  
 Cuthbert, A., Bradentown.  
 Dade Furniture Co., Box 298, Miami.  
 Dade, L. T., Ft. Pierce.  
 Dade, Mrs. L. T., Ft. Pierce.  
 Dahm, Miss E. M., Haines City.  
 Dallas, J. Y., Florence Villa.  
 Davidson, O. J., Box 373, Miami.  
 Daniels, A. M., 204 Cardy St., Tampa.  
 Daniels, Theo. F., Orlando.  
 Davenport, W. S., Box 512, Winter Haven.  
 Davidson, O. J., Box 373, Miami.  
 Davis, B. M., Lucerne Park.  
 Davis, E. P., 11 Ave. C., Maimi.  
 Davis, S. J., R. F. D., Homestead.  
 Dawson, Mrs. Paul, Box 77, Delray.  
 Day, H. R., Grand Island.  
 Day, Lee S., 600 W. Manatee Ave., Bradentown.  
 Day, Theo. H., Grand Island.  
 Deakin, Earl H., Box 395, Palm Beach.  
 Deal, John C., Oak Hill.  
 DeBeule, Dr. Remi B. J. M., Lutz.  
 DeBusk, E. F., Tavares.  
 Deering, Chas., Properties, Buena Vista.  
 Degering, Sam, Sebring.  
 Delamater, J. L., Box 214, Winter Haven.  
 Delamater, P. A., Winter Haven.  
 Delano, John, Palm City.  
 Dell, Geo. A., Gainesville.  
 Delray Apiaries, Delray.  
 Demster, E. H., Hypoluxo.  
 Denchfield, W. J., 242 Third St., N. E., Miami.  
 Denison, U. A., Winter Haven.  
 Denison, W. A., Winter Haven.  
 Derby, A. S., care of American Fruit Growers, Inc., Orlando.  
 Derby, Sen. John H., Rockledge.  
 DeVault, Geo. V., Umatilla.  
 DeVries, Gerben M., New Port Richey.  
 Dickerman, Mrs. Nellie A., Mt. Dora.  
 Dickey, C. A., Delray.  
 Dickins, Ernest M., Box 72, Lake Worth.  
 Dickinson, Alfred, Bonito Springs.  
 Dickinson, C. P., Orlando.  
 Dieffenderfer, J. G., Winter Park.  
 Dillingham, H. J., Largo.  
 Dimberline, Sam, Box 180, Sebring.  
 Divers, A. F., San Antonio.  
 Dixon, Robert L., Cocoa.  
 Dixon, S. Mannville.  
 Donavan, F. E., 311 Pembroke Place, W. Palm Beach.  
 Donnelly, J. B., Box 26, Palm Beach.  
 Donnelly, J. P., Mt. Dora.  
 Donnelly, Isabel M., Box 26, Palm Beach.  
 Donnelly, Thos., Indianola.  
 Dorn, Harold W., Larkins.  
 Dorn, Henry C., R. F. D. 4, Box 25, Gainesville.  
 Dorn, Robert W., Larkins.  
 Dorner, Geo., Bokeelia.  
 Dorsett, Roy J., Inverness.  
 Dorsey & Co., W. S., Gainesville.



- Douet, G., Tavares.  
 Dougherty, A. W., Box 223, St. Cloud.  
 Douglas, E. B., Miami.  
 Douglass, E. O., Sebring.  
 Dove, Dr. C. E., Box 179, W. Palm Beach.  
 Drake, T. P., Ocala.  
 Drane, Hon. Herbert J., Lakeland.  
 Drane, O. W., Lakeland.  
 Drew, Mrs. W. L., Eagle Lake.  
 Duekevitz, Wm. Edward, Box 61, DeLand.  
 Duncan, W. R., Box 692, Vero.  
 Dunn, W. Z., Homestead.  
 Dunne, J. H., San Antonio.  
 DuPree, W. Talmage, Citra.  
 Durrance, S. P., Avon Park.  
 Duval, L. W., Ocala.  
 Dyer, H., Stuart.  
 Dyson, Z. V., care of State Plant Board, Gainesville.  
 Earl, Binney W., Miami Beach.  
 East Coast Lumber & Supply Co., Ft. Pierce.  
 Eastlake Investment Co., Eastlake.  
 Eaton, E. L., Gainesville.  
 Eberhardt, W. F., Ft. Myers.  
 Ebert, Milo, Lake Wales.  
 Economy Grocery Co., Miami.  
 Edwards, Wm., Zellwood.  
 Eikenberry, H. D., Leesburg.  
 Elliott, H. H., Box 1442, Miami.  
 Ellis, G. R., Gainesville.  
 Ellis, Miss Louise, Gainesville.  
 Ellis, Richard A., Box 447, Tampa.  
 Ellis, T. B., Gainesville.  
 Emerson, Geo. D., Coconut Grove.  
 English, Alex, Winter Park.  
 English, J. C., Alva.  
 Evans, B. F., Boynton.  
 Evans, D. H., 418 Fern St., W. Palm Beach.  
 Evans, E. L., Ft. Myers.  
 Evans, L. H., Titusville.  
 Evans, Miss Marthana, 208 Villa Road, Winter Haven.  
 Evans, W. E., Leesburg.  
 Everett, Robert, Marco.  
 Fahs, W. N., Leesburg.  
 Fairchild, David, Coconut Grove.  
 Fairchild, H. E., Crooked Lake.  
 Farley, J. F., Malabar.  
 Farlow, G. W., Dundee.  
 Farr, W. J., Lily.  
 Farver, H. W., West Palm Beach.  
 Fattig, P. W., Box 315, Gainesville.  
 Faulkner, C. E., Lake Worth.  
 Feaster, J. T., Box 595, Miami.  
 Felt, F. D., Rt. 1, Box 45, Miami.  
 Ferran, H. A., Eustis.  
 Ferreira, J. C., 702 W. Church St., Orlando.  
 Fisher, H. T., Eustis.  
 Fisher, J. F., 608 S. Newport Ave., Tampa.  
 Fitch, Samuel H., Homestead.  
 Flemming, G. D., Box 717, Miami.  
 Fleming, Hubert, Kissimmee.  
 Fleming, Sam T., Gainesville.  
 Fletcher, F. W., Orlando.  
 Flint, Frank F., Lake Alfred.  
 Flipse, L. F., Rt. A, Miami.  
 Flitcraft, A. J., 509 Briggs St., Winter Haven.  
 Florida National Bank, Gainesville.  
 Floyd, Bayard F., Box 719, Orlando.  
 Floyd, Mrs. Bayard F., Box 719, Orlando.  
 Floyd, C. V., R. F. D. 1, Miami.  
 Floyd, W. L., Gainesville.  
 Fluke, T. J., New Port Richey.  
 Fogg, Harry W., Eustis.  
 Foster, E. A., Rt. 1, Box 19, Orlando.  
 Foster, P. W., W. Palm Beach.  
 Fowler, Mrs. Geo. W., W. Palm Beach.  
 Fowler, H. E., Box 225, Winter Garden.  
 Fowler, J. R., Gainesville.  
 Foxworthy, J. E., Ft. Myers.  
 Fraizer, Branson, Titusville.  
 Frank, Chas. P., Ft. Myers.  
 Freeman, W. D., Winter Park.  
 Frentress, T. L., Haskell.  
 Frey, John, Rockledge.  
 Frey, Mrs. John, Rockledge.  
 Friend, W., Palm Beach.  
 Frierson, Ed., Elfers.  
 Frierson, Hill H., Elfers.  
 Frisbie, S. L., 411 Curry Bldg., Tampa.  
 Fritch, E. D., Earman.  
 Frizzell, J. B., Lutz.  
 Froscher, Andrew, Titusville.  
 Froscher, E. A., Homestead.  
 Fuchs, Fritz, Miami.  
 Funk, L. I., Rt. 1, Box 96, Tampa.  
 Fussell, G. C., Leesburg.  
 Gable, P. K., Merritt.  
 Gaines, Geo. T., Jensen.  
 Gainesville Furniture Co., Gainesville.  
 Gallahn, E. H., R. F. D., Homestead.  
 Gant, Henry, 131 Amelia Ave., Orlando.  
 Gardner, Mrs. F. C., Lake Alfred.  
 Gardner, F. C., Lake Alfred.  
 Gardner, J. H., Vero.  
 Garnett, A. W., Hypoluxo.  
 Garr Citrus Plantation, Tavares.  
 Garrard, J. A., Bartow.  
 Garrett, Chas. A., Kissimmee.  
 Garrett, L., Rt. 1, Orlando.  
 Garrett, O. D., Sebring.  
 Garst, J. H., Sebring.  
 Gravey Bros., Ft. Myers.  
 Gaunt, E. C., Miami.  
 Gazzolo, F., 8 Chadbourne Court, W. Palm Beach.  
 Geier, Agnes I., Windermere.  
 Geier, Wm. G., Windermere.

- Geitgey, A. A., Glen St. Mary.  
 Gentile, L., Orlando.  
 Gentile, Jos., Jr., Miami.  
 German, D. J., Lake Worth.  
 Gibson, S. S., Delray.  
 Gilbert, Dr. Elsie M., R. F. D. 1, Box 89, Tampa.  
 Giles, J. L., Orlando.  
 Gilman, C. B., Lotus.  
 Gilman, J. H., Box 678, Miami.  
 Gilman, V. C., Crooked Lake.  
 Gilson, Miss Lily H., Hawks Park.  
 Gist, J. V., Key West.  
 Glass, Rev. Jas. G., Orlando.  
 Glenn, C. F., Wewahatchka.  
 Gobert, Dr. H. T., Gainesville.  
 Gocio, H. G., Bee Ridge.  
 Godden, G. V., Hypoluxo.  
 Godwin, S. W., Gainesville.  
 Goldberg, E. R., Homestead.  
 Gomme, Wm., Bartow.  
 Goodna, Eva B., Box 611, W. Palm Beach.  
 Goodrich, Chas., St. Cloud.  
 Goodwin, R. L., Ft. Pierce.  
 Gore, Mrs. Grovinger, Orlando.  
 Gossman, H. L., Homestead.  
 Gottrau, Louis de, Lake Worth.  
 Gracy, L. C., Gainesville.  
 Graham, H. B., Box 1112, Miami.  
 Graham, Jno. W., Box 605, Miami.  
 Grant, A. J., Dunedin.  
 Grandy, G. C. A., Winter Haven.  
 Graw, A. C., Homestead.  
 Gregory, Jane, Box 153, Lake Worth.  
 Green, E. P., Bradentown.  
 Green, G. F., Fellsmere.  
 Green, H. O., Micco.  
 Griffin, W. R., Rt. 1, Sutherland.  
 Griffing, A. M., Box 1263, Miami.  
 Griffing, C. M. & Co., 420 Duval Bldg., Jacksonville.  
 Griffith, J. W., Shiloh.  
 Griggs, H. L., Oak.  
 Griswold, A. W., Boynton.  
 Grosse, Otto R., Merritt.  
 Grossenbacher, J. G., Apopka.  
 Groover, F. C., Box 1090, Jacksonville.  
 Groover, Dr. W. R., Lakeland.  
 Groves, J. A., Sebastian.  
 Guller, Mrs. C. E., Stuart.  
 Gump, I. D., Panama City.  
 Gumprecht, H. G., Box 95, Bradentown.  
 Gurney, J. H.  
 Gustafson, Gus, Box 169 R. F. D., Vero.  
 Guy, Walter M. M. D., Box 973, St. Augustine.  
 Haffs, Gus, Delray.  
 Hagan, Lucy, M., 312 Jefferson Rd., W. Palm Beach.  
 Haines, Chas. D., Altamonte Springs.  
 Haines, E. T., Altamonte Springs.  
 Hainlin, Neal E., Homestead.  
 Hainz, Ed. L., Sebring.  
 Hale, Chas. P., Crescent City.  
 Hall, W. Hervey, Yalaha.  
 Hall, G. S., Oakland.  
 Hall, C. E., Boynton.  
 Hall, J. E., R. F. D. 1, Homestead.  
 Hall, J. E., Ft. Myers.  
 Hallinan, T. G., Winter Haven.  
 Hallstrom, Axel, Vero.  
 Hallum, T. F., Shiloh.  
 Hamm, H. O., Palatka.  
 Hamilton, A. H., 208 E. Park St., Lakeland.  
 Hamilton, D. E., Box 33, Dunedin.  
 Hamley, Fred W., R. F. D. 1, Ft. Pierce.  
 Hamlin, A. G., DeLand.  
 Hamner, B. L., Temple Terraces, Tampa.  
 Hamner, Mrs. B. L., Temple Terraces, Tampa.  
 Hampton, B. M., New Port Richey.  
 Hampton, W. W., Gainesville.  
 Hancock, J. C., Box 924, Miami.  
 Hancock, Jas. G., 333 N. E. 24th St., Miami.  
 Hand, Wm. E., Lakeland.  
 Hanford, F. T., Leesburg.  
 Hankins, L. R., Shiloh.  
 Hanna, J. C., Lutz.  
 Hansen, Wm. H., 219½ Clematis Ave., W. Palm Beach.  
 Harbrecht, L. C., Jensen.  
 Hardee, W. R., R. F. D. 1, Ft. Pierce.  
 Harding, E. E., Balm.  
 Harding, Wm. E., Box 40, W. Palm Beach.  
 Harold, A. R., R. F. D. No. 1, Box 597, Miami.  
 Harris, L., Lucerne Park.  
 Harriss, W. W., Ocala.  
 Harris, Dr. James, Lakeland.  
 Harrison, Marjorie E., Box 941, Winter Haven.  
 Harrington, Mrs. A. B., Box 94, Winter Haven.  
 Harrington, Mrs. C. W., Winter Haven.  
 Harrington, Mrs. C. W., Winter Haven.  
 Harrold, J. G., Gainesville.  
 Hart, Mrs. Geo. P., 6 Tanglewood Court, W. Palm Beach.  
 Hart, John W., 626 S. Poinsettia St., W. Palm Beach.  
 Hart, Oliver B., Box 163, St. Augustine.  
 Hartman, D. L., Little River.  
 Hartmen, John H., Palm City.  
 Hartshorn, B. I., Sebring.  
 Harvel, G. W., Box 245, Delray.  
 Harvey, John, Glen St. Mary.  
 Haskins, F. T., Sebring.  
 Hasson, H., care of Armour Fert. Wks., Jacksonville.  
 Hatch, F. W., New Smyrna.  
 Hatton, T. T., Bartow.  
 Haudinschild, R. E., Box 8, Lake Worth.  
 Hausmann, T. L., Vero.  
 Hawkins, H. E. C., St. Augustine.  
 Hawthorne Plant Farm, Nocatee.

- Hayden, Geo., Lake Worth.  
 Hayes, Chas. L., Clearwater.  
 Hayle, Seed Co., Miami.  
 Hays, D. G., 212 S. Sapodilla St., W. Palm Beach.  
 Hays, W. H., Gainesville.  
 Hayward, W. H., Box 250, Winter Park.  
 Hazen, H. E., DeLand.  
 Heck, Joy, R. F. D. 1, Miami.  
 Hecker, Chris., Box 92, Lake Worth.  
 Hector Supply Co., Miami.  
 Hefty, Caspar, Miami.  
 Heimburger, Lindley, Rt. A, Lakeland.  
 Heins, W. C., 1315 Collins Ave., Miami Beach.  
 Heltzen, John H., Orlando.  
 Helzscheiter, J. G., New Port Richey.  
 Hendell, B. R., Crooked Lake.  
 Henderson, J. Harvey, care of State Plant Board, Gainesville.  
 Henderson, R. C., Lake Worth.  
 Hendry, J. E., Ft. Myers.  
 Hennessey, A. L., Fellsmere.  
 Hentz, Mrs. Wm. B., Winter Haven.  
 Herbst, Emil, R. F. D., Ft. Pierce.  
 Hetherington, M. F., Lakeland.  
 Hewitt, P. A., Bradentown.  
 Hewke, T. S., "Golden Knoll," Winter Park.  
 Highsmith, D., Oneco.  
 Hill, W. A., Box 334, Miami.  
 Hill, A. M., Vero.  
 Hill, Arthur J. K., Box 152, San Antonio.  
 Hilliard, J. B., Princeton.  
 Hills, L. C., Panama City.  
 Hinsky, Jno. B., Daytona.  
 Hirset, Theo., 245 Flagler St., Miami.  
 Hiscok, J. D., Box 662, W. Palm Beach.  
 Hite, D., Lake Worth.  
 Hodnett, J. V., Auburndale.  
 Hogan, Miss C. M., 311 Jefferson St., W. Palm Beach.  
 Holahan, D. J., 30 Real Estate Bldg., Miami.  
 Holland, Frank, Mammoth Groves, Lake Wales.  
 Holmberg, J. L., Miami.  
 Holworthy, A. J., Lakeland.  
 Hooker, A. S., Winter Haven.  
 Horne, W. N., Bonita Springs.  
 Horton, C. E., Winter Haven.  
 Hosford, Ed. L., Jensen.  
 Hough, C. S., R. F. D. A, Box 560, Miami.  
 Houghton, Frank B., Lake Worth.  
 House, O. A., Box 13, Palm Beach.  
 Hoyt, Mrs. Agnes D., Clearwater.  
 Hubbell, Wolcott Wood, Palmetto.  
 Hubbard, Mrs. E. S., Federal Point.  
 Hudgings, Tom, Box 1077, Tampa.  
 Huelsbeck, Geo., Cottage Hill.  
 Hughes, Herman, Bradentown.  
 Hughs, W. D., Box 305, Miami.  
 Hull, W. N., Miami.  
 Hulbert, Thomas H., Orlando.  
 Hume, E. Grisdale, 2614 Riverside Drive, Jacksonville.  
 Hume, Mrs. E. N., 2614 Riverside Drive, Jacksonville.  
 Hume, F. N., Glen St. Mary.  
 Humphrys, Alfred S., Indianola.  
 Hunt, Chas. M., care of State Plant Board, Gainesville.  
 Hunt, Deeley, Gainesville.  
 Hunter, D. M., Box 259, Lake Worth.  
 Hunter, N. H., Ft. Myers.  
 Hurd, O. W., Gainesville.  
 Hurley, A. W., Box 137, Winter Garden.  
 Hutchinson, John LeRoy, Vero.  
 Ingraham, J. E., Box 1, St. Augustine.  
 International Products Co., Box 993, Miami.  
 Irey, Julian, R. F. D. 1, Orlando.  
 Ittner, Geo., R. F. D. A North, St. Petersburg.  
 Ivey, W. B., 331 St. Johns Ave., South Jacksonville.  
 Jackson, C. E., Box 784, Clearwater.  
 Jackson, G. D., Eustis.  
 Jackson, Harry, Lutz.  
 Jackson, F. L., 541 3d St., St. Petersburg.  
 Jackson, P. B., Lakeland.  
 Jacobsen, C., 1307 Fla. Ave., W. Palm Beach.  
 Jacocks, A. J., Okahumpka.  
 Janes, Geo., Clearwater.  
 Jarrett, H., 426 N. W. 2d Ave., Miami.  
 Javens, M. Marcellus, Mt. Dora.  
 Jeal, Geo. Crescent City.  
 Jefferies, Jno. H., Lake Alfred.  
 Jem Nursery Co., Lake Jem.  
 Jenkinson, Sydney G., Miami.  
 Jennings, Chas. B., Vero.  
 Jensen, Carl M., Boynton.  
 Jepson, John W. Tangerine.  
 Jerguson, A. P., Box 276, Key West.  
 Jernigan, W. P., Monticello.  
 Johns, H. D., R. F. D., Wauchula.  
 Johnson, A. B., Glen St. Mary.  
 Johnson, August P., Boynton.  
 Johnson, Chris. Marco.  
 Johnson, Claud F., St. Cloud.  
 Johnson Floral Co., Box 1202, Miami.  
 Johnson, Jos. B., Box 15, W. Palm Beach.  
 Johnson, J. E., Lakeland.  
 Johnson, J. E., Goulds.  
 Johnson, J. Lee, Sebring.  
 Johnson, J. W., Jensen.  
 Johnson, I. M., Box 206, Winter Haven.  
 Johnson, O. F., Piedmont.  
 Jones Bros., Sebring.  
 Jones, Edward R., Rt. 1, Miami.  
 Jones, Geo., Lake Wales.  
 Jones, John C., St. Lucie.  
 Jones, Lyman E., Gardner.  
 Jones, M. L., Box 92, Millville.



- Jones, O. A., Lake Wales.  
 Jordan, F. R., Eau Gallie.  
 Jordan, Phineas G., Box 202, Palm Beach.  
 Judy, G. W., Jacksonville.  
 Juergen, Mrs. M., W. Palm Beach.  
 Junkin, J. E., 1110 Ave. C., Miami.  
  
 Karlsson, Axel, Box 862, Clearwater.  
 Karst, E., R. F. D. 1, Orlando.  
 Kart, Henry, Winter Park.  
 Katz, H. M., Kissimmee.  
 Kaufman, E. J., Lakeland.  
 Kaune, Amos A., Ft. Myers.  
 Kay, Albert O., Ft. Pierce.  
 Keck, Irving, Bowling Green.  
 Keen, J. C., Delray.  
 Kelly, E. L., Homestead.  
 Kemp, Dr. C. F., Key West.  
 Kemp, Richard H., Box 82, Key West.  
 Kent, Edward W., Lake Hamilton.  
 Kern, John F., Jupiter.  
 Kerns, Frank W., Salerno.  
 Key, N. D., Orlando.  
 Keyes, W. T., Winter Haven.  
 Kieser, Fred, Lake Wales.  
 Kimball, J. S., Eustis.  
 Kimball, E. H., Earman.  
 Kime, Chas. D., Box 222, Orlando.  
 King, F. O., Box 75, Orlando.  
 King, Geo. A., Box 49, Okahumpka.  
 King, Wm. Avon Park.  
 King, W. L., Lakeland.  
 Kinsman, A. N., Box 410, Miami.  
 Kirk, Thomas V., Box 374, Jacksonville.  
 Kirkpatrick, J. E., Lake Worth.  
 Klemm, Arthur R., Winter Haven.  
 Klemm, A. Richard, Winter Haven.  
 Klemm, Mrs. A. M., Winter Haven.  
 Klock, J. E., Box 51, Sanford.  
 Knight, J., Mims.  
 Knight, J. M., Vero.  
 Knight, Joe, Elfers.  
 Knight, Robert A., Box 606, Pensacola.  
 Knowles, Geo. I., Key West.  
 Knox, L. B., Ormond.  
 Knox, R. H., R. F. D. 1, Box 498, Miami.  
 Knull Floral Co., Tampa.  
 Koplin, Geo. E., Winter Haven.  
 Kramer, L. H., Mammoth Groves, Lake Wales.  
 Kreamer, H. W., Ft. Myers.  
 Krebs, G. D., 508 Highland Ave., Orlando.  
 Kriechhaus, W. C., Dania.  
 Krome, Mrs. W. J., Homestead.  
 Krouse, Henry, Sebring.  
 Kunz, Alfred R., 612 Hillcrest Ave., Orlando.  
  
 Ladd, Frank H., Key West.  
 LaDue, J. G., Mt. Dora.  
 Lafon, N., Paisley.  
 Lainhart, Geo. W., Box 189, W. Palm Beach.  
  
 Laird, B. L., Sebring.  
 Lake Garfield Nurseries Co., Bartow.  
 Lamb, C. W., R. F. D. No. 3, Box 21, Wauchula.  
 Lamb, Jesse L., Oneco.  
 Lame, Chas. E., Box 70, Lake Worth.  
 Lamkin, Ward, Arcadia.  
 Lamphear, O. C., Lakeland.  
 Landstreet, A. F., Orlando.  
 Lang, Ed., Box 238, Delray.  
 Langston, E. J., Smith Creek.  
 Lanier, Virgil H., Box 1202, Jacksonville.  
 Larry, Dock, Thonotosassa.  
 Larson, Nels, Vero.  
 Larsson, Jonas, Piedmont.  
 Lauramore, H. H., Glen St. Mary.  
 Lawrence, E. S., Gotha.  
 Lawrence, Wyman, Crooked Lake.  
 Layton, Miss Harriette B., Tallahassee.  
 Lazonby, J. L., Gainesville.  
 Leach, Robert, Seminole.  
 Lee, C. S., Oviedo.  
 Lee, O. N., St. Cloud.  
 Lee, Mrs. Thomas G., Crooked Lake.  
 Lee, Wm. Justice, Box 378, Jacksonville.  
 Leesburg Realty Co., Leesburg.  
 Lejune, Chas., Rt. A, Miami.  
 Lenbrook, F. L., Delray.  
 Lenfest, R. E., Winter Park.  
 L'Engle, Mrs. John C., 314 Market St., Jacksonville.  
 Lent, Victor, Sorrento.  
 LeRoy, Merton, Box 301, Lake Worth.  
 Lester, E. S., Delray.  
 Lestina, Otto, Haskill.  
 Liles, A. G., Terra Ceia.  
 Lilly, Louis, W. Palm Beach.  
 Lincoln, L. F., Box 718, W. Palm Beach.  
 Lindner, Chas. A., R. F. D. Box 38, Homestead.  
 Lindner, Ross W., Largo.  
 Linderman, R. H., Lake Wales.  
 Linhart, R. A., Valrico.  
 Linsley, C. C., Ft. Myers.  
 Lipsey, L. W., Blanton.  
 Lloyd, Wm. G., Box 199, Lake Worth.  
 Loeffler, Frederick, W. Palm Beach.  
 Loennecke, H., 315 Wildmere Ave., W. Palm Beach.  
 Logan, Frank H., Oak.  
 Lord, Chas., Orlando.  
 Lott, Millard, Sebring.  
 Loveland, Clifton W., Satsuma Heights.  
 Lowe, Stephen F., Box 547, Key West.  
 Lowery, Dr. S. L., Tampa.  
 Lowry, E. A., Box 1138, Miami.  
 Lowry, Mrs. Irena B., 110 W. Duval St., Live Oak.  
 Lucas, C. Potter, Useppa Island.  
 Luckie, J. M., Box 13, Florence Villa.  
 Lukert, Wm., Salerno.  
 Lundberg, Ed. V., Orlando.

- Lyman, E. C., Ruskin.  
 Lyman, Mrs. Etta, Lantana.  
 Lyman, H. C., Altamonte Springs.  
 Lyman, W. I., Box 956, Orlando.  
 Lyons, C. W., 5401 Brock St., Tampa.
- Macaulay, Jack, Box 36, Delray.  
 Mace, J. P., Lake Helen.  
 Mace, L. P., Lake Helen.  
 Mack, Chas., Sharpes.  
 Mackay, Geo., Ocala.  
 Magoon, C. H., Dade City.  
 Majewski, L., Monticello.  
 Majory, Chas. J., Manatee.  
 Mallett, C. M., Orlando.  
 Manatee Hammock Fruit Co., Manatee.  
 Mandeville, Paul, Dixie Apts., Orlando.  
 Mangels, H. E., Box 347, Miami.  
 Mangold, J. A., 174 Central Ave., St. Petersburg.  
 Manley, Lester B., Miami.  
 Mann, W. W. & Son Co., Winter Haven.  
 Mapp, Edward, Stuart.  
 Marford, Geo., Grand Island.  
 Markle, Geo. W., Winter Haven.  
 Markley, R. T., Clearwater.  
 Marra, Sabino, Box 195, Tangerine.  
 Marsh, Geo. S., Jr., Box 50, Orlando.  
 Marsh, Jas. F., Winter Haven.  
 Martins, P. M., 144 N. E. 1st St., Miami.  
 Martini, C. A., care S. A. L. Ry., Tampa.  
 Martin, G. B., Sebastian.  
 Martin, Geo., Sebastian.  
 Martin, S. H., Oak.  
 Martin, W. E., Orlando.  
 Martin, Wm. J., Orange City.  
 Marvin, Rev. Mrs. F. de F., R. R. 2, Orlando.  
 Mason, A. C., Box 491, Orlando.  
 Masters, W. G., Ft. Myers.  
 Matheson, Hugh M., 1608 Ave. G., Miami.  
 Mathews, S. F., Homestead.  
 Mathis, W. B., Glen St. Mary.  
 Matthanis, G. C., Box M, W. Palm Beach.  
 Maul, E. N., Orlando.  
 Maurer, A. Phil, Box 848, Orlando.  
 Mawman, Geo. A., 22 Haviland Bldg., Miami.  
 Maxwell, P. D., No. 1 Dallas Park, Miami.  
 Mays, E. D., care of S. A. L. Ry., Jacksonville.  
 McCabe, P., Box 95, San Antonio.  
 McCall, W. W., Lake Alfred.  
 McClave, W. S., 1258 N. W. 7th St., Miami.  
 McClanahan, S. L., Sebring.  
 McClelland, W. S., Eustis.  
 McCollum, J. W., Gainesville.  
 McComville, Paul B., Ft. Pierce.  
 McCord, F. E., Palm City.  
 McCreary, S. J., Tamiami Hotel, Miami.  
 McCulloch, John, Box 829, Orlando.  
 McDonald, Alexander, Leesburg.  
 McDonald, Alexander, Jr., Leesburg.  
 McDonald, J. A. Co., Miami.
- McElroy, Dr. Sylvan, Orlando.  
 McGragar, C. D., Winter Haven.  
 McGuire, Wm. A., Ocala.  
 McKissock, Mrs. John L., Lake Worth.  
 McLaughlin, W. C., Terra Ceia.  
 McLendon, A. S., Ft. Myers.  
 McLendon, H. S., St. Augustine.  
 McLendon, H. G., Ft. Myers.  
 McLeod, J. S., Homestead.  
 McMichael, H. D., Box 931 Tampa, Fla.  
 McMurray, Dr. Robert, Sebring.  
 McQuarrie, C. K., Gainesville.  
 Mead, Theo. L., Oviedo.  
 Means, Eva C., Gainesville.  
 Melton, Wm., W. Palm Beach.  
 Mendel, Geo. E., Hawks Park.  
 Mendel, Mrs. G. E., Hawks Park.  
 Mendel, Jos., W. Palm Beach.  
 Mercer, Edward W., 618 13th Ave. S. W., Miami.  
 Mercer, Miller T., Box 503 Miami.  
 Merchant, A. D., Box 599, W. Palm Beach.  
 Meres, Amelia F., Tarpon Springs.  
 Meridith, C. C., Boynton.  
 Merrell, Herman, St. Petersburg.  
 Merrill, Geo. B., Gainesville.  
 Miami Bank & Trust Co., Miami.  
 Michelson, Hamilton, Box 927, Miami.  
 Milam, M. A., Miami.  
 Miles, Franklin, Ft. Myers.  
 Miley, C. M., Box 212, Tampa.  
 Mill, John P., Leesburg.  
 Miller, A. L., Box 254, Delray.  
 Miller, B. C., Kissimmee.  
 Miller, C. H., Box 100, Goulds.  
 Miller, E. H., care of Chamber of Commerce, Miami.  
 Miller, Geo. A., Box 352, New Augustine.  
 Miller, Harry E., 111 Central Ave., Winter Haven.
- Miller, H. J., Boynton.  
 Miller, M. E., Leesburg.  
 Miller, M. M., Sebastian.  
 Miller, Phillip, Gainesville.  
 Miller, W. B., Boynton.  
 Miller, W. F., Box 2303, Tampa.  
 Millington, Wm. V., Box 484, Key West.  
 Mills, Mrs. Mary P., Box 86, Plant City.  
 Minion, Arthur, Banyan.  
 Minor, T. J., Ocoee.  
 Mitchell, J. F., Box M, Titusville.  
 Mitchell, Mrs. M. G., Bartow.  
 Mitchell, R. G., 513, Jessamine St., W. Palm Beach.  
 Model Land Co., St. Augustine.  
 Moeller, L. A., Vero.  
 Moeller, Theodor, 301 Poinsettia Ave., W. Palm Beach.  
 Montgomery, Dr. J. H., Gainesville.  
 Montray Corporation, 14 Flagler St., Miami.  
 Moore, H. E., Haines City.

- Moore, John L., Haines City.  
 Moore, J. W., R. F. D. Box 182, Lakeland.  
 Moore, K. C., Box 269, Ocala.  
 Moore, M. K., Ft. Pierce.  
 Moore, Capt. W. R., Box 910, W. Palm Beach.  
 Moore, W. S., Lakeland.  
 Moore, W. W., Box 6, Winter Haven.  
 Moran, D. W., Box 655, Miami.  
 Morehead, Chas. D., New Port Richey.  
 Morehead, Caroline, Ocala.  
 Moreman, M. S., Switzerland.  
 Moreno, B. Curry, Key West.  
 Morgan, Frank, Gainesville.  
 Morgan, John A., Box 225, New Port Richey.  
 Morgan, Jessie T., 110 R. F. D. Lakeview Ave., St. Petersburg.  
 Morrey, E. B., Apopka.  
 Morris, Ben. H., Box 1172, L. B., Miami.  
 Morris, F. H., Box 105, Ormond Beach.  
 Morris, Geo. P., Gainesville.  
 Morris, J. W., Lake Worth.  
 Morton, Mrs. Caroline L., 108 Summerlin Place, Orlando.  
 Morton, Miss Gertrude P., 108 Summerlin Place, Orlando.  
 Mosby, L. L., Oak Hill.  
 Moses, David B., Box 90, W. Palm Beach.  
 Moses, Elwyn N., Ft. Pierce.  
 Moseley, H. A., Goulds.  
 Moss, F. E., Lakeland.  
 Mountain, James, Brooksville.  
 Mowry, Harold, Box 1713, Jacksonville.  
 Moznette, G., Box 1134, Miami.  
 Mucklow, Walter, Hill Bldg., Jacksonville.  
 Muir, Wm., Box 205, St. Petersburg.  
 Munroe, Lee R., Havana.  
 Munroe, Venable, Archer.  
 Murray, J. O., R. F. D. 1, Homestead.  
 Murrell, S. G., Box 402, Bartow.  
 Murrill, Miss Ethel, Gainesville.  
 Musky, Chas. R., Oak.  
 Minter, F. L., Boynton.  
 Myers, Chas. Hypoluxo.  
 Naberhuis, H. A., 1029 5th St. N. W., Miami.  
 Nanney, Wm. C., Box 474, Lake Wales.  
 Negus, C. R., Indrio.  
 Nehrling, W. F., Orlando.  
 Neighbor, John J., Ocala.  
 Newell, Wilmon, Gainesville.  
 Newell, V. G., Ft. Pierce.  
 Newett, A. W., Groveland.  
 Nichols, A. C., Clearwater.  
 Nickels, F. E., Box 35, W. Palm Beach.  
 Nieman, H. F., Lake Worth.  
 Noll, John, Jr., Sanford.  
 Nolen, R. E., Fellsmere.  
 Nordman, J. B., DeLand.  
 Nordman, Ferd., New Smyrna.  
 Norris, Hardgrove, 1813 Perry St., Jacksonville.  
 Nutler, Wm., M. D., Lake Worth.  
 Oakley, A. R., Lake Worth.  
 Oberholtzer, John V., Emeraldal.  
 O'Byrne, F. M., Gainesville.  
 Oglesby, R. M., Bartow.  
 Ohlhaber, Wm., Box 64, W. Palm Beach.  
 O'Kelley, E. B., Jacksonville.  
 Olds, Orida, Marco.  
 Oliphant, Ross G., Oneco.  
 Opitz, Adolph, Box 611, Ft. Pierce.  
 Opitz, E. W., Owanita.  
 Oprey, Dr. H., Lake Wales.  
 Orman, D. J., Lake Worth.  
 Osborn, E. W., Box 32, Lakeland.  
 Osteen, J. W., Altamonte Springs.  
 Osteen, T. B., Lakeland.  
 Ott, John, Vero.  
 Overocker, W. H., Frostproof.  
 Overstreet, M. O., Orlando.  
 Paddison, Mrs. R. P., care Dade Lumber Co., W. Palm Beach.  
 Padgett, Wm., Enterprise.  
 Palmer, H. W., Fruitland Park.  
 Palmer, J. C., Windermere.  
 Pancoast, Thos. J., Miami Beach.  
 Pamer, J. B., Ft. Myers.  
 Parham, Harry C., care of State Plant Board, Gainesville.  
 Parrish, M. M., Gainesville.  
 Park, Bradley, Lake Worth.  
 Park, Geo. W., Dunedin.  
 Parker, C. H., care of Fla. Agri. Supply Co., Jacksonville.  
 Parkinson, Edward, Alva.  
 Parry, T. H., Bartow.  
 Parsons, Nels, Lake Worth.  
 Partridge, Miss Sarah W., Tallahassee.  
 Passolt, John, 317 N. Olive St., W. Palm Beach.  
 Patten, B. A., Loughman.  
 Patten, Marcellus A., S. Florida Ave., Lakeland.  
 Patterson, E. M., Lakeland.  
 Pattillo, C. T., Shiloh.  
 Pattillo, Mrs. C. T., Shiloh.  
 Payne, Chas. B., Lake Worth.  
 Peacock, H. R., Rt. 1, Box 579, Miami.  
 Peacon, Richard, Box 345, Key West.  
 Pearce, Eugene L., Clearwater.  
 Pearson, I. J., R. F. D. 1, Homestead.  
 Pelleterson, J. L., 812 N. W. 12th St., Miami.  
 Pennock, Herbert A., Box 118, Jupiter.  
 Penrifo, C. A., Grand Island.  
 Pepper, Wm. M., Gainesville.  
 Perran, J. A., Eustis.  
 Perrin, R. G., Box 818, Winter Haven.  
 Perkins, Hon. Jas. W., DeLand.  
 Perry, John W., Hypoluxo.  
 Peter, E. B., Leesburg.



- Peterkin, G. W., Box 73, Lakeland.  
 Peterkin, Mrs. G. W., Box 73, Lakeland.  
 Peter, Asher, Orlando.  
 Peterson, A. T., R. F. D. Box 1701, Vero.  
 Peterson, Dr. J., Miami.  
 Peterson, John A., Groveland.  
 Peterson, John D., Pierson.  
 Peterson, Ole, Princeton.  
 Pfuntner, C. H., 335 N. E. 15th St., Miami.  
 Phelps, H. W., Bradentown.  
 Phelps, A. A., Oakland.  
 Phifer, J. A., Gainesville.  
 Phifer State Bank, Gainesville.  
 Phillips, Geo. W., Orlando.  
 Phillips, W. Paul, 19 Hill St., Orlando.  
 Phillips, P., Orlando.  
 Piche, Thos. D., Homestead.  
 Pickard, W. M., Sebring.  
 Pierson, J. R., Sharpes.  
 Plano, H. C., Kissimmee.  
 Player, Harry, Box 752, Tampa.  
 Plitt, Geo. Moran, Tavares.  
 Pollard, W. F., Sebring.  
 Poole, E. S., Vero.  
 Poole, S. F., Lake Alfred.  
 Poole, Mrs. S. F., Lake Alfred.  
 Pope, J. M., Fruitland Park.  
 Poppendick, H., 130 N. Miami Ave., Miami.  
 Porter, J. W., Hypoluxo.  
 Potter, R. D., Box 203, Tampa.  
 Powell, Jas. C., Boynton.  
 Powell, W. B., Tavares.  
 Powers, T. W., Lake Hamilton.  
 Prange, F. C., Box 815, Vero.  
 Preston, Mosel, Bartow.  
 Preston, W. H., Tampa.  
 Preston, Walter L., Tampa.  
 Prevatt, A. B., Seville.  
 Price, Roy M., W. Palm Beach.  
 Pritchett, H. E., Lakeland.  
 Provost, Chas. D., Georgiana.  
 Pruden, Alfred J., Winter Haven.  
 Pumpel, Mrs. R., Lake Worth.  
 Putnam, H., 314 Fern St., W. Palm Beach.  
 Putney, E. D., Avon Park.  
 Quaily, John D., Box 204, Delray.  
 Quaintance, W. D., Lake Wales.  
 Quartz, Wm. H., New Port Richey.  
 Quinze, Harry de, Box 92, San Antonio.  
 Raab, A. G., R. F. D. Box 181, Homestead.  
 Racer, Mrs. Jas. M., Lantana.  
 Rahn, Wm. J., Haines City.  
 Ragin, R. T., Oak Hill.  
 Railey, F. G., care of Railey Milam Hdw. Co., Miami.  
 Rainey, J. S., Miami.  
 Ralls, Mrs. Ada T., Keuka.  
 Ralston Bros. Co., 12th St and Ave. A, Miami.  
 Randall, F. A., Haines City.  
 Randolph, R. F., Box 371, Clearwater.  
 Rane, F. W., 213 Clematis Ave., W. Palm Beach.  
 Ranson, L. T., Box 493, Delray.  
 Ratcliff, J. B., Box 253, Lake Worth.  
 Raulerson, C. H., Earman.  
 Ray, Alexander, City Hall, Jacksonville.  
 Raymond, W. W., Owanita.  
 Realty Securities Corporation, 27 1st St. N. E., Miami.  
 Reasoner, Egbert N., Oneco.  
 Reasoner, Norman A., Oneco.  
 Redd, J. D., Homestead.  
 Redfield, L. A., Auburndale.  
 Reedy, Thos. E., Key West.  
 Reese, Chas. A., Gainesville.  
 Register, H. H., Lakeland.  
 Register, S. T., Groveland.  
 Reid, Wm. C., Largo.  
 Reinsch, Bruno, R. F. D., Ft. Lauderdale.  
 Reynolds, Arvilla, Delray.  
 Reynolds, M. L., Ocala.  
 Rhodes, L. M., 417 St. James Bldg., Jacksonville.  
 Rhudy, J. H., Gainesville.  
 Rice, R. H., R. F. D. A, Miami.  
 Rice, Dr. S. D., Gainesville.  
 Richardson, Homer J., 5502 Branch Ave., Tampa.  
 Richards, R. I., Ft. Myers.  
 Riche, Thos. D., Homestead.  
 Richmond, L. C., Miami.  
 Ricker, R. C., Box 6, Bradentown.  
 Ricker, R. C. Mrs., Bradentown.  
 Riggs, W. E., Vero.  
 Rinck, A. J., Crescent City.  
 Ringdahl, G., White City.  
 Ringhausen, Edw., Rt. 1, Box 16, Orlando.  
 Rippburger, P. J., Sebring.  
 Robb, G. F., Sebring.  
 Roberts, A., R. F. D., Dade City.  
 Roberts, Dr. Chas. M., Umatilla.  
 Roberts, D. M., R. F. D. No. 1, Box 45, Homestead.  
 Robertson, A. H., Rt. B, Lakeland.  
 Robertson, D. W., Orlando.  
 Robertson, D. H., Rt. B, Lakeland.  
 Robertson, Paul F., Rt. B, Lakeland.  
 Robins, Raymond, Brooksville.  
 Robinson, G. A., Lake Wales.  
 Robinson, Tom R., Orlando.  
 Robinson, T. Ralph, Terra Ceia.  
 Robinson, Mrs. T. Ralph, Terra Ceia.  
 Robinson, W. R., Lake Helen.  
 Rock, Wm. F., Ft. Dade.  
 Rogell, J. D., Palmetto.  
 Rogers, D. E., Lisbon.  
 Romph, E. C., care of 1st Nat. Bank, Miami.  
 Romph, Geo. B., Box 16, Miami.  
 Roney, Edward, 208 New Tatum Bldg., Miami.  
 Rose, A. L., Box 194, W. Palm Beach.  
 Rose, Hon. R. E., Tallahassee.

- Rose, Mrs. R. E., Tallahassee.  
 Rose, Walter W., Orlando.  
 Rose, J. B., R. F. D., Homestead.  
 Ross, J. B., R. F. D. A, Miami.  
 Ross, Dr. J. H., Winter Haven.  
 Ross, Mrs. J. H., Winter Haven.  
 Ross, W. A., Kathleen.  
 Ross, W. G., Fruitland Park.  
 Rothwell, Mrs. Laura, Box 151, Lake Worth.  
 Rountree, Sam, Macclenny.  
 Rouse, Dr. W. O., St. Petersburg.  
 Roush, F. W., E 165 9th Ave. N., St. Petersburg.  
 Rowe, A. P., Groveland.  
 Rowe, R. L., Tillman.  
 Rudisel, Dick, Orsino.  
 Ruhl, P. A., Sebring.  
 Rumpfelt, Geo. H., Oak Hill.  
 Rumpel, Mrs. R., Lake Worth.  
 Ruprecht, R. W., Gainesville.  
 Rush, F. G., Orlando.  
 Ruyfler, Chas. H., W. Palm Beach.  
 Ryall, B. L., Sebastian.
- Sadler, Dr. O. W., Mt. Dora.  
 Safford, Mary A., Orlando.  
 Sample, Dr. J. R., Haines City.  
 Sample, Dr. M., Haines City.  
 Sampson, F. G., Boardman.  
 Sampson, Mrs. F. G., Boardman.  
 Sanders, B. S., Box 1104, St. Petersburg.  
 Saunders, J. L., Miami.  
 Sawyer, R. J., Bee Ridge.  
 Saxton, E. E., Rt. A, Lakeland.  
 Schabinger, J. J., Delray.  
 Schermerhorn, C. F., Oak Hill.  
 Schlobig, John, Box 331, Homestead.  
 Schmidt, Peter C., Boynton.  
 Schnabel, John, Glen St. Mary.  
 Schneider, A., Plant City.  
 Schober, Dr. W. B., Coconut Grove.  
 Schoenthaler, Mrs. F., Box 104, Lake Worth.  
 Schroeder, Conrad C. P., Boyette.  
 Schubert, W. J., care of Armour Fert. Co., Jacksonville.  
 Schucht, Walter, Winter Park.  
 Schultz, F., Hobe Sound.  
 Schultz, W. H., Winter Park.  
 Schumacher, Henry E., Homestead.  
 Schumacher, E., Lotus.  
 Schumacher, H. P., Homestead.  
 Schuyler, K. E., Miami.  
 Scott, J. B., Winter Haven.  
 Scott, L. W., Tallahassee.  
 Seaverns, Herbert, Avon Park.  
 Sebring, H. O., Sebring.  
 Seekins, W. W., Salerno.  
 Seminole Seed Co., Gainesville.  
 Seng, Wm. J., Leesburg.  
 Sessions, D. L., Orlando.  
 Sessoms, Wm. A., Bonifay.
- Sewell, E. G., Miami.  
 Sewell, John, Box 900, Miami.  
 Sexton, W. E., Vero.  
 Seymour, R. N., Lake Worth.  
 Sharp, Howard, Box 253, W. Palm Beach.  
 Shaw, Miss Eleanor G., Mt. Dora.  
 Shaw, Wm. P., Dade City.  
 Sheffield, Chas. P., Canal Point.  
 Sherman, D. C., Lake Gem.  
 Sherman, F. L., Ft. Pierce.  
 Shoard, H. C., Dade City.  
 Shooter, C. C., Earleton.  
 Shrines, Ike M., Largo.  
 Shultz, W. W., Haines City.  
 Sias, D. P., Orlando.  
 Siedenburg, A. E., Oneco.  
 Simmonds, Edward, Plant Introduction Garden, Miami.  
 Simmons, H. H., 25 Ocean St., Jacksonville.  
 Simpson, James, Mt. Dora.  
 Sinclair, L. C., Villa Road, Winter Haven.  
 Skelly, F. L., Orlando.  
 Skernier, G. H., Box 1491, Tampa.  
 Skiff, Ernest Gage, Sebring.  
 Skinner, B. C., Dunedin.  
 Skinner, F. L., Dunedin.  
 Skinner, L. B., Dunedin.  
 Skinner, Mary E., Dunedin.  
 Skinner, R. E., care of Hillsboro Hotel, Tampa.  
 Slagle, M. C., Box 676, Ft. Lauderdale.  
 Slattery, J. M., care of Exchange Supply Co., Tampa.  
 Slaughter, C. M., Orlando.  
 Slettner, C., 115 S. Miami Ave., Miami.  
 Sligh, S. J., Orlando.  
 Smart, Herbert, Crooked Lake.  
 Smith, A. M., Florence Villa.  
 Smith, A. T., Ft. Myers.  
 Smith, Claud L., Vero.  
 Smith, Cleve F., Largo.  
 Smith, Dr. D. T., Gainesville.  
 Smith, Gould, Naples.  
 Smith, Henry, Box 314, Sebring.  
 Smith, Herman D., Stuart.  
 Smith, J. B., Box 131, Delray.  
 Smith, J. A., care of Hotel Astor, Orlando.  
 Smith, J. D., Marianna.  
 Smith, Leon S., 618 Cedar St., Jacksonville.  
 Smith, Lisle W., Haines City.  
 Smith, Lonnie S., Boynton.  
 Smith, O. E., Wauchula.  
 Smith, R. F., 53 Real Estate Bldg., Miami.  
 Smith, V. C., Fruitland Park.  
 Snively, John A., Winter Haven.  
 Snook, M. A., Weirsdale.  
 Snook, Sam'l A., Weirsdale.  
 Snook, T. B., Weirsdale.  
 Snow, Minabel, Box 538, Route 1A, Miami.  
 Soar, Ira E., Dade City.  
 Soar, Mrs. J. J., Little River.

- Soar, J. J., Little River.  
 Soar, V. H., Royal Palm Hotel, Miami.  
 Sobol, William, Gainesville.  
 Sommer, Carl A., Citra.  
 Soper, J. J., R. F. D. No. 1, Homestead.  
 Southern Feed Co., Miami.  
 Southern Fert. Co., Orlando.  
 Spadaro, Frank C., Ft. Pierce.  
 Spencer, A. P., Gainesville.  
 Sperry, W. D., Lakeland.  
 Spicer, E. E., Gomez.  
 Springfels, Chas. F., 219 Lake View Ave., W. Palm Beach.  
 Staley, Eugene W., 251 Flagler St., Miami.  
 Stalls, B. E., Rt. 1, Tampa.  
 Stambaugh, S. U., 1111 Ave. A, Box 881, Miami.  
 Stansfield, Chas., Wauchula.  
 Starling, B. J., 321 Magnolia Ave., Sanford.  
 Starnes, Thos. L., Winter Haven.  
 Stayman, D. F., Box 178, Lake Worth.  
 Stearnes, Ralph W., Weirsdale.  
 Stebbins, Dr. H. H., Thonotosassa.  
 Steele, Earl L., Glen St. Mary.  
 Stegmann, Hugo, Boynton.  
 Stephens, Chas. R., Glen St. Mary.  
 Stephens, Ernest, Elfers.  
 Stephens, Thos. H., 626 Okeechobee Rd., W. Palm Beach.  
 Stetson, Frank K., Ft. Pierce.  
 Stevens, C. H., 334 6th Ave., St. Petersburg.  
 Stevens, H. B., Box 303, DeLand.  
 Stevens, H. E., Ft. Myers.  
 Stevens, H. W., Box 942, Clearwater.  
 Stevenson, Richard D., Elfers.  
 Stewart, W. H. D., Box 673, Miami.  
 Stipe, Tobias, Sebring.  
 Stirling, Frank, Gainesville.  
 Stirling, Mrs. Frank, Gainesville.  
 Stitts, Chas., Boynton.  
 Stoadwin, E. W., Hypoluxo.  
 Stokes, C. R., Sebring.  
 Stockett, A. W., Bee Ridge.  
 Strait, O. W., Thonotosassa.  
 Stratton, G. H., City Point.  
 Straub, H. L., Weirsdale.  
 Stringfellow, H. M., Pineland.  
 Stuart, E. L., Bartow.  
 Sturrock, W. D., W. Palm Beach.  
 Suchomel, Joseph, Box 199, W. Palm Beach.  
 Summers, Dr. Albert T., Grambling Bldg., Miami.  
 Sunshine Fruit Co., Coconut Grove.  
 Superior Nurseries, Orlando.  
 Sutherland, D. B., 616 Jessamine St., W. Palm Beach.  
 Swann, J. Lee., care of A. A. C. Co., Tampa.  
 Swanson, A. L., W. Palm Beach.  
 Swenson, Ole, Box 10, Lake Worth.  
 Swartsel, J. F., Elfers.  
 Swartsel, N. M., Elfers.  
 Swindel, J. C., Lakeland.  
 Switzer, Dr. C. R., Winter Park.  
 Swope, O. P., Oviedo.  
 Taaffe, R. A., Leesburg.  
 Taber, G. L., Jr., Glen St. Mary.  
 Tabor, Mrs. G. L., Glen St. Mary.  
 Talbot, W. O., Goulds.  
 Tarter, C. R., City Point.  
 Tatum Bros. Co., Miami.  
 Tatum Land Co., Miami.  
 Taylor, Mrs. B. W., Jupiter.  
 Taylor, Mrs. Jas. A., Oak Hill.  
 Taylor, Jas. A., Shiloh.  
 Taylor, Jas. J., care of Ocala Mfg. Co., Ocala.  
 Taylor, J. H., care of Ocala Mfg. Co., Ocala.  
 Taylor, John S., Largo.  
 Taylor Nurseries, Shiloh.  
 Taylor, Robt. R., Jr., Box 176, Miami.  
 Taylor, W. D., care of Ocala Mfg. Co., Ocala.  
 Taylor, W. S., 3905 Ashley St., Tampa.  
 Teele, Albert L., Boynton.  
 Temple, Mrs. W. C., Winter Park.  
 Terwilligar, A. C., Titusville.  
 Thacher, R. R., 929 S. Dakota Ave., Tampa.  
 Tharber, H. W., Lake Worth.  
 Tharp, Wm. H., Sarasota.  
 Thayer, G. E., Crooked Lake.  
 Thomas Awning & Tent Co., Miami.  
 Thomas, C. E., Tampa.  
 Thomas, E. R., R. F. D., Homestead.  
 Thomas, Irving, Coconut Grove.  
 Thomas, Paul, Wauchula.  
 Thompson, C. H., Box 818 Winter Haven.  
 Thompson, Mrs. C. H., Box 818, Winter Haven.  
 Thompson, Frank, Frostproof.  
 Thompson, J. F., Box 241, Lake Worth.  
 Thompson, Dr. J. L., Frostproof.  
 Thompson, N. H., Homestead.  
 Thompson, Ralph B., Box 818, Winter Haven.  
 Thornton, W. R., Box 12, Redland.  
 Thort & Knight, Box 783, Miami.  
 Thulberry, A. C., Lake Wales.  
 Thys, Leo., Box 626, Elfers.  
 Tilden, A. M., Winter Haven.  
 Tilden, Mrs. A. M., Winter Haven.  
 Tilford, Frank B., 2219, Biscayne Drive, Miami.  
 Tilghman, W. G., Palatka.  
 Tillinghast, B. F., Crescent City.  
 Tillinghast, Mrs. B. F., Crescent City.  
 Tillinghast, Miss Helen, Crescent City.  
 Tillman, J. M., Winter Haven.  
 Tinstman, B. E., Ft. Myers.  
 Tippin, Gus T., Vero.  
 Titus, H. S., Dunedin.  
 Titus, R. W., Oak.  
 Toadvin, E. S., Hypoluxo.  
 Todd Lumber Co., R. H., Ocala.  
 Todtenhausen, A., Lake Worth.  
 Toms, Chas. Stanley, Box 167, Miami.  
 Tourist News, St. Petersburg.



- Tourtellotte, L. E., Limona.  
 Townsend, J. L., Wauchula.  
 Townsend, J. F., Lake Wales.  
 Townsend, Miss Kate, Istachatta.  
 Towsend, J. W., Merritt.  
 Traxler, Leon W., McIntosh.  
 Trevor, Benj. D., Key West.  
 Trimble, F. H., Orlando.  
 Troup, J. L., Delray.  
 Troxler, T. W., Ocala.  
 Truskett, E. E., Mt. Dora.  
 Tucker, Mrs. Helen S., Merritt.  
 Tucker, M., Gainesville.  
 Tuller, R. J., Leesburg.  
 Tupper, E. R., Lutz.  
 Turlington, J. E., Gainesville.  
 Turner, Mrs. B. G., 1718 1st Ave. N. E., Miami.  
 Turner, C. C., Little River.  
 Turner, H. A., Glen St. Mary.  
 Tydings, Mrs. C. R., Ocala.  
 Tyler, A., Glen St. Mary.  
 Tyler, Chas. H. (address not given.)  
 Tysen, J. R., Jacksonville.
- Ullendorff, Mrs. P., 536 S. W. 12th Ave., Miami.  
 Ulmer, Henry L., Largo.  
 Ulmer, Julius E., Sutherland.  
 Ulmer, M. W., Largo.  
 Umlauf, Gustaf, Gainesville.
- Valentine, Geo. C., Palmetto.  
 Vance, J. H., Box 16, Lantana.  
 Vaniman, O. S., Ft. Lauderdale.  
 Van Roy, Frederick, Crystal River.  
 Veach, H. W., Leesburg.  
 Venable, Monroe, Archer.  
 Ventura, Robert S., Box 14, South Palm Beach.  
 Vickers, E. W.  
 Vidal Drug Co., Gainesville.  
 Vincent, T. A., Quay.  
 Vinopal, Jas. J., Lake Worth.  
 Vorghy, A. W., 418 Hibiscus Ave., W. Palm Beach.  
 Voss, F. C., Hypoluxo.  
 Vremain, L. R., Mt. Dora.
- Wade, D. O., Box 763, Sarasota.  
 Wade, Geo. W., Miami.  
 Waddell, Edwin A., Miami.  
 Wadsworth, D. L., Wimauma.  
 Wadsworth, Edwin, 38 Standish Place, Jacksonville.  
 Waite, Mrs. F. D., Bradentown.  
 Wakelin, Amos, Tavares.  
 Wakelin, Mrs. E. M. L., Tavares.  
 Wakelin, Guilford M., Tavares.  
 Wakelin, Mrs. M. W., Tavares.  
 Waldin, A. H., Homestead.  
 Waldron, J. V., Rt. 1, Ft. Pierce.  
 Waldron, M., Crooked Lake.
- Walker, A. C., Sutherland.  
 Walker, E. C., Vero.  
 Walker, R. F., 111 W. Gove Ave., Orlando.  
 Walker, Seth, Citrus Exchange Bldg., Tampa.  
 Walker-Skagseth Co., Box 351, Miami.  
 Walker, Shirley B., Box 842, Miami.  
 Walmy, Jas., Box 944, Miami.  
 Walsh, C. A., R. F. D. 1, Ft. Lauderdale.  
 Walters, Willis W., Maitland.  
 Walton, W. K., Homestead.  
 Wambrey, Ernest, Eustis.  
 Ward, C. H., Winter Park.  
 Ward, H. B., 814 S. Sapodilla St., W. Palm Beach.  
 Ward, T. A., Boynton.  
 Warner, L. R., Key West.  
 Warner, O. D., Daytona.  
 Warner, S. C., East Palatka.  
 Warren, Alfred, Ft. Pierce.  
 Warren, Geo. E., Miami.  
 Watkins, P. C., Sharpes.  
 Watts, B. F., Leesburg.  
 Waughtel, Prof. C. W., Clarcona.  
 Weatherbee, J. E., White City.  
 Webb, W. H., Winter Haven.  
 Webster, Miss Agnes I., Tallahassee.  
 Wedge, Clarence, Ft. Lauderdale.  
 Weiland, Chas., Estero.  
 Weiss, Fred, 916 Graham Bldg., Jacksonville.  
 Weissinger, J. F., 518 Citizens Bank Bldg., Tampa.  
 Wells, B. B., City Point.  
 Welch, G. W., Gainesville.  
 Wendel, Henry, Gotha.  
 West, C. J., Lake Stearns.  
 West, C. L., Oviedo.  
 West, Dr. J. A., Winter Haven.  
 Wester, J. W., Macclenny.  
 Westmoreland Gardens, Lakeland.  
 Wever, E. C., R. F. D. No. 1, Homestead.  
 Wheeler, J. A., 726 Poinsettia Ave., W. Palm Beach.  
 Whitcomb, H. R., Lake Gem.  
 White, A. L., Ft. Myers.  
 White, Geo. E., Gainesville.  
 Whitehouse, Thomas, Sebring.  
 Whitney, I. E., Jensen.  
 Whittaker, W. R., Manatee.  
 Whittington, R. R., Panama City.  
 Wichtendahl, Karl, Gotha.  
 Wigfield, Miss Virginia, Quay.  
 Wight, B. D., Buena Vista.  
 Wightman, L., Box 576, Tampa.  
 Willetts, C. O., Orlando.  
 Williams, L. G., Keystone Park.  
 Williams, J. J., Box 53, Larkins.  
 Williams, I. T., Bradentown.  
 Williams, S. F., 600 Prof. Bldg., Jacksonville.  
 Williamson & Dennis, Box 1812, Jacksonville.  
 Willoughby, C. H., Gainesville.

Wilcox, Ray, Hypoluxo.  
Wilkins, J. H., Ft. Green.  
Wilkinson, Willis, Orlando.  
Wilmshurst, H. J., DeLand.  
Wilson Company, Gainesville.  
Wilson, D. Carl, Box 324, Miami.  
Wilson, Dr. Frank, Estero.  
Wilson, J. P., Lakeland.  
Wilson, Leo H., Kissimmee.  
Wilson, Wm., Panama City.  
Winchester, E. L., Boynton.  
Winfield, T. A., Miami.  
Winston, J. R., Orlando.  
Witt, Mrs. Henry S., Elfers.  
Wittbecker, Frank C., Box 62, Arcadia.  
Woefle, E. H., Ritta.  
Wood, E. J., Vero.  
Wood, Harvey G., Box 1158, Miami.  
Woods, C. O., Rt. 1, Homestead.  
Woodbury, C. H., R. F. D., Homestead.  
Woodrow, Davis S., Ocala.  
Woodruff, Hamilton, Box 1154, Jacksonville.  
Woodruff, Seth, Orlando.  
Woolfolk, I. B., Orlando.  
Woolverton, W. B., 10 W. Concord St., Orlando.  
Wooten, J. L., Sutherland.

Worthen, S. T., 349 5th St. N., St. Petersburg.  
Wright, Edgar A., care of Fla. Grower, Tampa.  
Wright, J. L., Homestead.  
Wyman, A. F., Bradentown.  
Wyman, J. A., Sharpes.

Yahn, Adam J., R. F. D. 1, Orlando.  
Yocum, W. F., Ocala.  
Yonally, W. D., Winter Haven.  
Yonge, J. E. D., Pensacola.  
Yonge, Hon. P. K., Pensacola.  
Young, G. W., Florence Villa.  
Young, J. W., Lake Wales.  
Young, Mary A., Eustis.  
Young, Robert, Ft. Pierce.  
Yount, A. H., Ft. Lauderdale.  
Yowell, N. P., Orlando.

Zaborowski, J., R. F. D. Box 252, Tampa.  
Zellner, H., Grady, Lakeland.  
Zetrou, R. G., Rochelle.  
Zeluff, U. C., Box 283, Tampa.  
Zimmerman, E. L., Oldsmar.  
Zimmerman, F. J., Oldsmar.  
Zurn, H. A., Orlando.

# Proceedings of the Thirty-Fourth Annual Meeting of the Florida State Horticultural Society

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One of the most enjoyable and profitable features of the Miami meeting was the presence of Dr. David Fairchild, Agricultural Explorer in charge of the Office of Foreign Seed and Plant Introduction of the Bureau of Plant Industry of the United States Department of Agriculture, whose address during the evening of Wednesday, April 13th, and whose active participation in the discussions of the meeting was a source of much pleasure and inspiration to every member present. The average fruit grower in Florida has had little knowledge and appreciation of the great work which Dr. Fairchild and his co-workers have been carrying on for the benefit of Florida Horticulture. Traveling in the distant corners of the earth under great difficulties and at times at great hazards, they have brought back seeds and plants of great value to the farmers and fruit growers of America. His men are at the present time searching in tropical countries for hardy varieties of avocados and other fruits with which to build up a new fruit industry in Florida.

Unfortunately his work has not had the hearty support that it should have. It is only through great enthusiasm for their

work and a vision of the wonderful future that lies in the development of temperate and tropical agriculture in America, that they have been able to make such progress under the great odds of meager appropriations and lack of moral support. His address on the "Horticultural Pioneers of the Tropics," which is published in full in this Proceedings, will be of great inspiration to every Florida horticulturist and make him proud to be a Floridian.

As usual the attendance at the annual meeting was not at all proportionate to the total membership which has, at time of going to press, reached the 2,000 mark. There was, however, an enthusiastic crowd in attendance and an enjoyable and profitable meeting. There were but few coming from the central and west coast sections who had realized the wonderful development that the cities of Miami and Miami Beach had made since the time of our annual meeting there nine years ago. The beautiful plantings about the many homes and on the large estates were an inspiration that will doubtless lead to similar developments in other parts of the State.

So many individuals contributed to the success of the meeting, that it is difficult



to give credit by naming all. A most attractive exhibit of exotic plants in the parlors of the Halcyon Hotel, arranged by James Donn of Miami, assisted by N. A. Reasoner of Oneco, deserves favorable mention. It is hoped that exhibits of this sort will be made at future meetings and that these will in time lead to the establishment of an annual Flower Show under the auspices of the Horticultural Society, at which prizes of such importance can be offered to attract the best growers. Since Florida is the Land of Flowers, it is quite logical that it should have an annual Flower Show that will be surpassed by none in America.

A small but excellent exhibit of very fancy fruit was arranged and shown by different marketing agencies. This also should be a feature at every meeting of the Society.

The large membership that the Society enjoys is due largely to the efforts of Mr.

Frank Stirling and his co-workers. An indefatigable worker, he devoted his whole energies at personal sacrifice for the benefit of the Society. Few people realize the difficulties and expense entailed in building up a large membership. Unless the expense can be reduced during the coming campaign, it will be necessary to ask the Society at its next annual meeting to increase the annual membership fee. The members can help to avoid this situation by remitting their annual fees for 1922 to the Secretary at Orlando, Florida, promptly upon receipt of this Proceedings or of the first notice that the annual fee of one dollar is due and payable.

The Proceedings of the Florida State Horticultural Society should be in the home of every fruit grower in Florida. The Society should have a membership of more than 5,000. It can have this number if every member will help.

## OPENING

H. Harold Hume: The Thirty-fourth Annual Session of the Florida State Horticultural Society will now come to order. We will have an opening prayer by the Reverend Merrill.

Prayer.

H. H. Hume: It is usual as a part of our program at the opening meeting to have an address of welcome and the address tonight is to be made, not by Mr.

Sewall whose name is on the program, but by a man who has been deeply interested in the development of Florida for a good many years; a man who has in many ways done much to advance the horticultural interests of the State; a man who is almost a resident of Florida. It is my pleasure to introduce to you for this address Dr. David Fairchild.

# Address of Welcome

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Dr. David Fairchild, Coconut Grove

I don't know why I have been asked to welcome you to this southern tip of Florida. I am not a resident of the State, though I would be if I could and shall be some day. Perhaps those who chose me to speak felt sure that I would tell you something which would make you feel that you are doing a great work in the world.

I am conscious of the compliment and I am grateful for the opportunity, though had I my way I should have brought the greatest man in America to do honor to you, for in my opinion no praise is too high for those of you who are making of the sandy and rocky and swampy lands of this State one of the greatest garden spots which the world has ever seen.

There was once a time, ladies and gentlemen, when to scribble more than one's name on paper was to be a contemptible scrivener in the eyes of the then leaders of society. There was a time when to perform a surgical operation was to be classed among the barbers—a class which then begged for admission to the household at the convenience of the patron. There was even a time when to watch the stars and speculate with regard to the universe was to be cast into dungeons for heresy. There was a time, and it was not long ago, when to work with one's hands among the plants was to be classed

with the horse jockies whose stable talk shut them out of polite society.

But as civilization has advanced it has brought with it a better understanding of the value of things and tonight, if I were a prophet, I would promise you, ladies and gentlemen of the Florida Horticultural Society that your time is nearly here. And by your time I mean the era when any educated man will be as much ashamed of not knowing an elm from an oak as he is today of not knowing the capitals of the principal countries of the world.

If I were a prophet I would even promise you your share of the honor which is due you for saving from extinction the rarest and most beautiful of living things which still exist on this planet and which the populations of future ages will prize and cherish with a love which we in our present state of development are totally incapable. I mean the trees and shrubs and flowering plants, which are threatened with extinction.

In my many years of travel I have met all kinds of men and women and I feel a certain confidence when I say to you that in so far as you are enthusiasts and investigators in the great field of horticulture you are already above any class of people in the world—the one class to be envied.

You live in the deeper levels of life; in a world which is filled with more than the flitting shadows of human personalities; in a world of forms and colors more fascinatingly wonderful than the shifting clouds at sunlight because each shape, each color has a meaning which you have learned to understand. Yours is the fuller life, and though you may see around you the glittering luxuries of existence beyond your reach, you have in your plant companions a solace and comfort which no amount of wealth can give.

You, in your passion for plants, are the envy of many a millionaire who has trodden Wall Street so long that he cannot quit it; of thousands of those who, looking out from their office windows over crowded, smoky cities, long for the shade of an orchard tree or for that drink of water flavored by the thirst of a tired body.

No. You who live in your own homes, surrounded by your own families, among the plants which you love, are following what is to become the chosen profession of some of the highest intellectual beings which this world is to produce.

But I am not here to tell you *who you are*, even though I do think we need to be reminded sometimes that we are doing more than merely earn an honest living. It helps us to hold our heads above the crowd; to raise high, where the world can see it, the profession which we believe has such a mission to perform for the human race.

But I am here to welcome you to Miami and tell you that every citizen in this region is interested in what you are doing, and in your getting a correct idea of

what this civilization here is, and in your having a good time.

Ladies and gentlemen, you are among open minded people here and I suppose I am voicing the opinion of the men of Miami when I say that you are at liberty without any offence to draw any invidious comparisons which you wish with regard to the width of our streets and the lack of parks. I feel sure that I am not offending those who live on Miami Beach when I say you are more than welcome to the sand there. I know that the residents of Redlands section will point out to you themselves the fact that there are a few rocks in the soils there. I am confident that there is not a settler on the Glades who would wilfully deceive you into thinking that the temperatures never go below freezing there. I know, because I live there myself, that the residents of Coconut Grove do not want you to go away with the impression that their town is trying to rival Miami in size.

No. The long training and severe experience which these people of South Florida have had with men and women like you has taught them that there is no permanency in anything but the truth; that you are not to be deceived by appearances. And yet when I remember my first visit to Miami; when I bring back into the foreground of my mind a picture of some holes blasted in the rocks near the ragged edges of the half cleared hammock into which I was expected as an Agricultural Explorer of the Government to pour seeds and plants, gathered from various parts of the world, I am forced to admit that one must be very careful in



judging of appearances for they are deceiving.

But I dare not tell you how enthusiastic I am about this region for after all as a government official who has fascinations in every State it would be indiscreet and I would be playing false to those plant pets in other States which are just as interesting and just as promising as the tropical ones which are making their little beginnings here; plants which are at personal risk and strenuous effort being hunted for by explorers of the Department of Agriculture in various parts of the world.

But you are more than simply the Florida State Horticultural Society, ladies and gentlemen. You are the largest body of men and women in the whole world which is interested deeply in the subject of tropical horticulture. And during the deliberations of your Society which are to come I sincerely trust that you will look upon yourselves not merely as one of the State Horticultural Societies of America but as that one to which has been entrusted the vast and fascinating problems of the horticulture of the tropics.

You are in a very peculiar sense experimenters. There is scarcely a single one of you who has not growing in the doorway of his home a tree or shrub of some kind which he is watching with the clear eyesight of early morning. Its behavior as a little seedling, its first leaves even, its first blossoms, its first fruit, the insects which first find and attack it, and its first fungus disease, as well as its response to the feeding with commercial fertilizers which you give it, are all things to you of the keenest intellectual interest.

Your interest in these things is not that of a bystander but that of a parent who wants the plant to grow for it is your particular plant and in your imagination you see it as it will be perhaps when you are old.

Nothing can take the place of an observation of occurrences. It is the direct way and you who are living close to the plants are the ones to find out things about them.

And let me say to you without any desire to flatter you that it is your interest in those new plants which my associates and I have had the great pleasure of importing for you during the past twenty-three years, which has furnished the continuous stimulus and encouragement to our explorers in foreign countries to undergo hardships in order to get the new plants.

And now you have come together to exchange your observations and get acquainted with each other and see what kind of men these are who publish about what they see and especially what they think.

It is in your power, ladies and gentlemen, to make this a great meeting.

I have attended many scientific meetings in my life and some religious gatherings. I have gone away from both lifted up and enthused or disgusted and irritated, depending upon occurrences which though trivial in themselves, contaminated with personal criticism and sarcasm the whole atmosphere of the assembly.

I recognize that we cannot in scientific matters be uncritical, that pride of opinion has really no place in science, that humility and perfect frankness make rapid

progress possible. But I also feel sure that the weakness of our organizations lies too largely in the fact that the coefficient of irritability is too high with most of us and we indulge in destructive criticism of each other which is reflected in the public's attitude towards us and we do not get the hearing which we deserve, nor the money which we need and should have.

If I only knew you all personally I would like to introduce you to each other. I hope that those of you who are bothered with a natural reserve will recollect that this is a meeting for the purpose of making new friendships, that you have come for that purpose, and, reserve or no reserve, will introduce yourself to anybody who you think can advise you or who in any way interests you.

Before turning you loose, so to speak, on each other and on the community, there are two facts which it seems important to emphasize.

The first is that the Plant Introduction Garden on Brickell Avenue, which I hope you will all see, is not an Experiment Station, and it is not an arboretum. It is a plant propagating garden primarily where mother plants are kept from which propagating material can be taken for budding and grafting onto small seedlings which are sent out all over the United States—wherever they can be grown. It is under the auspices of the Federal Department of Agriculture and the Bureau of Plant Industry and is one of six similar gardens located in various parts of the United States and maintained by the Office of Foreign Seed and Plant Introduction. The new plants which the ag-

ricultural explorers of that office find in gardens are first made available to the experimenters in the State Experiment Stations and then to private experimenters who apply for them to the Washington central office.

It cannot avoid being a center of information but it publishes no bulletins of its own and carries on no plot experiments with fertilizers and makes no pretense to anything but what it is; a place where the new plants which are imported through the international machinery of the Federal Department of Agriculture are maintained and increased as rapidly as funds and the nature of the plants will permit.

It contains only 6 acres of land which are leased for a nominal sum from Mrs. Mary Brickell and the lease has only eight years more to run. It was started in 1898.

Through the generosity of Mr. Charles Deering a new site consisting of twenty-five acres at Buena Vista has become the property of the government and on it there have already been assembled many new plants which will be interesting to the members of this society. Unfortunately, shortage of funds and the war have seriously interfered with the rapid development of this new garden.

The superintendent of these two gardens is Mr. Edward Simmonds, too well known to many of you to need any introduction. His assistant is Mr. Steffani, and it will be their pleasure as well as my own to meet any members of this Society at any time of day at the older of these two gardens—that on Brickell avenue, below Twentieth street.

The second fact which I would impress upon your memory is that since the first of January Miami has had a scientific institution known as The Miami Aquarium and that its director, Mr. Mowbry, welcomes you to it as members of a scientific society. The badge of the Society will admit you at any time of day to a sight of the most remarkable under-sea scenes which have ever been arranged

and you should not fail to give yourself the pleasure of seeing the gorgeous tropical fishes and other remarkable sea creatures which are on exhibition there.

On behalf of the citizens of this whole community, extending from Little River to Homestead, I have been requested to extend to you the heartiest welcome of which its residents are capable.



# Response

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B. L. Hamner, Tampa

*Mr. President, Dr. Fairchild, Ladies and Gentlemen:*

On behalf of the Florida State Horticultural Society, Dr. Fairchild, I want to express to you and the citizens of Miami our deep appreciation of the hospitality which you have so generously expressed. I know that our visit here will be attended both with pleasure and with profit. With pleasure because hospitality is synonymous with Miami, and the opportunity for hospitality in Miami is great by reason of your proximity to Bimini and to Cuba—the oasis in an arid country.

I know it will be attended with great profit because you have many, many object lessons here. I believe that one of the great object lessons which you present in Miami is the lesson of co-operation. The causeway which leads from Miami to your beach was only built through the co-operation of your citizens.

I believe that we will learn here the lesson of vision because a few years ago your beach and the islands which are arising in your bay were but a sandbar and a mangrove swamp which to men of less vision would have appeared to be without value and without use. And when we have seen the wonderful things which you are doing with it I know we are going to accede to you the right to the title of "The Magic City."

I believe that we will learn the lesson of faith because one could not ride over this city and out to Coconut Grove without knowing that it was a combined citizenship which helped build those beautiful homes; and that they had faith in Miami and that without faith they could not have built.

I believe that we will learn the lesson of courage because we know something of the struggle that it has taken to acquire these things and to accomplish the things which you have. You have shouldered burden after burden of indebtedness which to men without vision and without faith would seem staggering. You have built in advance of your time and I know that it takes a great amount of courage to do the things that have been done here.

We are also going to learn common sense, because in Dade County you have had foresight. You have made this a tick-free county and you have acquired for yourself common sense and reasonable laws respecting fences.

I believe that we are going to learn optimism because people could not take the rather uninviting looking mangrove swamps that you had along your shore and along your bay and work them into the beautiful things that you have here

without a wonderful amount of optimism.

Now, I believe that these lessons which will be learned will be of great benefit to the State because the members of the Horticultural Society are really builders and if they can catch some of this spirit and send it out over the State it will mean that the State will build as you have builded a city. I am glad that you appreciate the value of the membership of the Horticultural Society and I hope that the people of Miami will catch something of your broad grasp as to the understanding that these people have. To my way of thinking, the Horticultural Society has been the promoter of the best thought that has been in the State; and the ideas that have built the State to its present greatness in agricultural and horticultural lines have come forth from this Society. I know that the best thought and that the best experiences on the subject of agriculture and horticulture have been brought out in the thirty-four annual meetings of

this Society. So I know that the people here will feel that the hospitality which they have expressed and which they will show has not been ill spent.

I regret on behalf of a number of the members of the Society that your Mayor was not here to express a welcome as he did to the insurance men but he has passed the word along—along subterranean channels we will say—that if one becomes tired and dry and feels that this is an arid country he has but to approach the first policeman that he meets on the street and if he does not from him acquire the information for which he seeks to please report it to the Mayor and he will not be without a friend. Now I merely repeat that so those who have not heard it through subterranean channels will get it direct.

I again express to you our great thanks and I know that we will all enjoy our visit here and as I said the meeting will be attended with great pleasure and with great profit. I thank you.

# President's Annual Address

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H. Harold Hume

We refer to our various crops, to their size and importance in the agriculture of the State, to the number of carloads we ship, to the amount of revenue we derive from them, and this Society is interested in all of these. But there is another crop, which, measured by any standard we may set up, surpasses in value potential or actual all these—our boys and girls, the youth and children of Florida. No one can measure their value in the development of the State. We speak of our broad tilled acres, of our undeveloped resources, but what are these without men and women? And these boys and girls are the future men and women. What they do, what they will become, is what Florida will do and become. Granted they are well born, as they have a right to be, their value is potential, it is not active. They are only possibilities; they are not developed and their development for usefulness in various lines of endeavor, depends upon ourselves and the training we give them.

In Florida, compulsory education has recently come into effect. It should have come long ago, and no citizen with the right point of view would have it otherwise. But the very fact that we have compulsory education puts an added responsibility upon us. If, as in the past, we said to a child, "Here is a school, you may attend it or stay away from it," we

might with some show of reason be less concerned about the conditions in that school than we can be now, when we say to the child, "Here is a school, you must go to it." Operating under compulsory education, we have undertaken an added obligation to see that proper buildings and equipment are provided and that trained teachers are placed in charge.

Moreover, if we are to measure up to the needs of our cosmopolitan population, we must see that our educational facilities are of the best. We are anxious to attract to our State, as more or less permanent residents, the best people from other sections of the country; but these same people have the welfare of their children most at heart and will not come unless we have schools of the right standard to take charge of their education. In many of the rural districts of Florida, a school year of six months is the rule and we cannot expect people to relinquish the opportunity to send their children to better schools which are open nine or ten months and come to Florida. Ways and means must be provided for putting our public schools on the proper footing. Do not mistake me, the improvement in our public schools in the last two decades has been very marked and in many parts of Florida, the schools rank with the best. But we should not rest in our efforts un-



til all are equal to the best. We are not on the right footing when public schools in one part of the State are good and in another poor.

There is another phase of this question which is also worthy of our attention. The better the condition of our public schools and the more pupils who make their way through them, increased in numbers by compulsory education if you will, the greater the demand upon our institutions of higher learning.

The first of these demands is a demand for trained teachers to take charge of elementary school work. At the present time Florida is drawing very largely upon other states for her teaching forces. In schools of first rank in the State, it is, perhaps, not too much to say that eighty-five to ninety per cent of our teachers come from and receive their training in other states. Fortunate we are that they can be secured, but methinks the State in a larger measure should be meeting its own requirements. Sometimes it is an advantage that teachers should have been trained in something of the State's traditions, something of its viewpoint, something of its necessities, something of its own peculiar problems.

Upon our institutions of higher learning there is also a demand for increased facilities to care for larger student bodies and it is to this latter phase of the question that I now desire to call your attention. Never in the history of our country was there so great a demand for trained men and women as there is now. If the war taught us anything, it taught us the need of training. We realize, of course, that training is not an end, it is

but the means to an end. The trained man can go more swiftly and certainly to his object than the untrained.

The development of our State most certainly lies along agricultural lines. We cannot hope to reach that development which our resources make possible without trained men and women to take up the work. Training and knowledge they must have or fail. These they must get, either in the school of experience at their own or someone else's expense, a slow method at best; or they may get it at a well equipped school. To meet our agricultural requirements this training can be secured nowhere else than in Florida. Our conditions are peculiar, not duplicated elsewhere. Our crops, our soils, our climate, our entire environment are all different, or our problems are different in their handling from what they may be elsewhere. Unless the tiller of the soil brings to his work, a knowledge of applied Florida agriculture his chances of success are, to say the least, greatly reduced.

Many failures have been made in Florida, in this you will agree, though generally we magnify our successes and minimize our failures. Most of these failures have been due to lack of knowledge. If our State is to grow and develop, we must have men trained in the many different branches of Florida horticulture and agriculture, and this training cannot be done so well elsewhere as in Florida. A man may follow the vocation of farming in North Carolina, and take it up with equal facility and with equal chances of success, but not so in Florida. We must have men trained to work with Florida

plants under our own peculiar, and pardon me for saying it, exacting conditions. Even though this training might be secured elsewhere, it would still have to be had in an agricultural school and such schools are almost without exception state-supported schools. We therefore place ourselves in the position of beggars, asking other states to do for our youth what we will not do for them ourselves.

Now, what of our important state schools? No institution in this country ever had a more efficient and patriotic corps of teachers than is to be found at our State University at this time. But efficiency, loyalty, and patriotism, though they may carry teachers far, are not all. These men lack space; they lack equipment; they are too few in numbers for their task; they are overworked to the breaking point, and woefully underpaid. Nothing but deep and abiding interest in their work, their belief in their mission and their hope in the future keeps them at it. What has been said of the force at our own University, is true in like measure of the instruction personnel of our State College for Women. In scholarship, in quality of educational work, there are no institutions in America that rank higher than these. But they are unable to adequately meet the demands made upon them and ultimately this teaching force, an asset of first importance to our State, must have relief, or go elsewhere. The question plainly put, is, shall we maintain these institutions on their present plane, give them sufficient funds to pay the teaching force a living wage and enable these schools to meet the needs of the youth of the State; or shall we allow

them to degenerate into second rate schools and turn from their doors those seeking preparation for their life work in building a greater Florida. Florida can answer this question only one way, and with your help, in the right way. Florida has at no time a more vital problem to solve, and none for which a correct solution is of so much importance in the development of our commonwealth.

Now the correct solution of these questions means increased taxation. Increases or readjustments in taxation are not viewed with popular favor. Taxes are always regarded as a burden. But here is a situation where the welfare of our children is at stake, where the development of our State along broad lines is in question. We must therefore take a different view of the whole matter. Our forests may be removed, our mineral resources may be depleted, but so long as Florida's soil and Florida's incomparable climate last so long will the products of our fields be numbered first among Florida's resources. We can hope to maintain our position only with the help and leadership of trained men.

The financial readjustments through which we have been and are passing, have been felt in Florida, of course. While some people are pessimistic over present conditions, yet from a horticultural point of view, it may help us to remember that our State, our Florida is not in such condition as it was in the spring of 1895. Profits may have disappeared, during the present season, but the principal still remains; whereas in the spring of 1895 both principal or investment and profit had been wiped out. Again if we com-

pare conditions in our State with conditions as we find them in other parts of the world, or even of our own country, we have reason to be well pleased and we have moreover good grounds for taking an optimistic view of our financial conditions. Florida is a State of many and varied resources, and the conditions through which we are passing are not permanent. They will pass away ere long, leaving us on a sounder footing than ever before.

No one acquainted in a general way with Florida during the past quarter of a century can fail to be impressed with the very remarkable material development which has taken place during that time. Villages and towns have sprung up where there were none before; towns have become cities and cities have added tens of thousands to their population. New industries have come into being, vast areas of land have been brought into cultiva-

tion, and wealth has increased many fold.

But if because of the present temporary conditions, we fail to care for the educational needs of the State, we do a permanent and lasting injury to coming generations and to our State, an injury which subsequent favorable action will not remove.

The situation must be met now. The present session of the State Legislature should take the necessary steps to permit counties or school districts to say what their school millage should be. They should make ample and adequate provision for our State institutions of higher learning even though taxes be increased and new ways of taxation invented. Education is of fundamental importance and our State can advance only as its education is advanced. Thousands are flocking to our schools and we must provide necessary facilities for their training.



# Horticultural Pioneers of the Tropics

## WHAT THE FEDERAL GOVERNMENT IS DOING TO HELP THEM

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David Fairchild, Agricultural Explorer in Charge of Foreign Seed and Plant Introduction

Horticulture is an expression of human intelligence. It does not differ in this respect from sculpture or architecture. They all result in the creation of forms. There is this difference though. Horticulturists are working with living, growing things, whereas sculpture and architecture are concerned with materials which stay for ages where man puts them. But just as piles of rock or banks of clay do not make architecture and sculpture, so plants do not make horticulture.

The tropics are filled with plants but there is amazingly little horticulture in the tropics. The great living persistent intelligences are not there.

Look the tropics over and what do you find? Here and there some lonely, flickering, intellectual light which refuses to be put out by that wet blanket of indifference which will sooner or later smother any but the most brilliantly burning flame.

It has been my peculiar position during the past twenty-two years to be in touch with these lonely intellects of horticulture scattered throughout the tropical world and the picture of their struggle continually stirs my emotions.

They are building little places which, like the small clearings of some tropical

forest, grow up again to weeds and lianas as soon as the wood chopper dies. They select new varieties of fruits or vegetables but these are lost again. They plant variety collections of their pets but when they die who cares for them?

Around government-owned and operated gardens of the Tropical Colonies of various European countries there are little centers of horticulture which rally now and then the few congenial spirits who for short periods happen to be located there as officials or business men. As a rule, however, these are show gardens with laboratories attached to them in which research work for the planters is done on some of the staple tropical crops of the colony. Of tropical horticulture there is amazingly little.

But if you have agreed with me that horticulture is the expression of human intelligence it can be easily shown why there is so little horticulture in the tropics. There are so few people there of the kind of intelligence necessary for its development. We are inclined to overestimate the white populations of the tropics. I wonder if many of you know that scattered over the whole group of islands in Hawaii there are only 30,000 white people; that Jamaica has only a little over

15,000; and Trinidad about the same; and that in the whole Dutch East Indies which stretches for 3,000 miles around the globe at the equator there are only 80,000 Europeans and half castes. The Straits Settlements have not much over 8,000; and Natal with its 35,000 square miles has only 98,000 whites in it, whereas Queensland with over half a million square miles of territory has only 380,000 whites and the largest city in it which is the largest white city in the tropics has only 168,000 inhabitants.

When you remember how small a proportion of people are interested in horticulture anyway and how scattered the populations of the tropics are I believe you will be prepared to accept my statement that *there are more people in Florida who are interested in tropical horticulture than in any other place in the world.*

At a risk even of offending those tropical regions of both hemispheres, therefore, I believe it is perfectly proper to address you, gentlemen horticulturists of the Florida Horticultural Society, as the horticultural pioneers of the tropics.

But you are so by reason of your position rather than by reason of your accomplishments, great as those have been; and it is my pleasure to address you today with a view of helping you go ahead and prove what I believe you have already proved, that you are the chosen people, the great pioneers of tropical horticulture.

We all know that Florida can scarcely claim to have even her nose inside the region of tropical lowlands. She might be compared with some great Mesa rising

from some tropical plain with her plateau visited by the cold winds and frosts of the 8,000 foot altitude. She is too cold for the plants, but ideal for the people; and settling there like blackbirds on a rice field, they come in swarms. The whites have found a climate just above the tropics where they can live and work out of doors. This is one reason why you will be great pioneers. Horticulture is peculiarly an art of the hands. Who ever heard of a horticulturist who could not bud and graft and perform all of the necessary operations connected with the propagation of plants.

But there is another great reason why you will be the pioneers. It will pay you. The product of your art will have a commercial value. It will pay its way. Compare the lure of \$750 profit from a single avocado tree or \$130 from a mango tree with the lukewarm interest which a better variety of either of these fruits produces when offered in a market swarming with inferior varieties.

"What is the use?" said Dr. Kraemers from Java as he was eating some delicious Florida oranges and bewailing the fact that they never had any good oranges in Java. "The people would not pay any more for them if I introduced them."

Mr. Popenoe wrote me from Ecuador that he had found a plantation there of the most delicious of all tropical fruits—the Mangosteen, but that the fruits were rotting on the ground. Imagine it, gentlemen, fruits of the mangosteen, which has been rightly called the Queen of Tropical Fruits, going to waste in the only respectable sized orchard of that

fruit in the Western Hemisphere. No market.

What developed the horticulture under glass, of Belgium, where one could travel for hours under acres of whitewashed panes? The London and other markets which were willing to pay any prices almost for Gros Colemans, Black Hamburg grapes or wall nectarines. No horticulture will develop unless those engaging in it can make a good living out of it, for those who can produce good fruit belong to the most intelligent people in any country and they will not live on the ragged edge of society. They must have the necessities and some of the luxuries of an intellectual life or they will drift into other occupations. This is why you find in the tropics generally such inferior fruits and vegetables. Nobody of intelligence wants to engage in their production. It does not pay.

But there is still another reason. People have to learn to like tropical fruits and vegetables. It is one of the strange phenomena of life—this acquiring of a taste for something new. When I first returned from a stay in the eastern tropics where I had formed a liking for many interesting tropical fruits I was annoyed to find on every side people who had the idea that there was something mawkish and over sweet about the fruits of the tropics. The ridicule to which some of the very finest of them all were subjected was enough to discourage anyone; and had we not become so involved in their fate in this country by starting out to grow them, I sometimes wonder if we would have persisted in a study of them. It used to seem as though my friends

were purposely antagonistic towards these beautiful fruits and many an unhappy hour did their jibes and ridicule cause me.

But it was all unnecessary, for theirs was the perfectly natural reaction towards something new and time has taught me that even the lower animals and the insects at first refuse almost any new food to which they are not accustomed. But why then should this difficulty present an advantage to Florida. Because of all the peoples in the world the American is least fixed in his food habits. How this has come about I do not know. Whether it is a part of the general adaptability of this mixed race which is developing under this climate with its tremendous temperature changes would be important to know. That it is a fact I believe can be proven.

If we take a look at the development of British horticulture or French horticulture we get a picture of fashionable garden parties and flower and fruit shows; of royalty appearing at this one and awarding medals or at that taking prizes for their gardens. It is wealth and the rivalries of competing gardeners of great estates which have produced some of the finest varieties of flowers or fruit. Millions have gone into this horticulture of Great Britain—many millions. Think of the craze for hyacinths and mulberries, and orchids, and rhododendrons; or the costly fruit houses where at one time even the mangosteen was fruited; or the ferneries and now the rock gardens for whose crannies explorers would scale the crags of the Himalayas or brave the wild men of the land of the cross bow.



These things have not come in the tropics to any extent because there were too few people. But they will come and the question which I wish you to look at today is whether the horticulturists of Florida are not really destined to be the pioneers in this new horticulture of the tropics.

They have a climate in which they can work with their own hands all the year round. They have around them in increasing numbers each year the people of means. They have large numbers of young people to recruit their ranks from. They have a public more willing to take new fruits than the world ever saw before. That public goes and comes from the great centers of a great country which is of all the countries in the world the greatest fruit eating one. The drift of dietetics is towards a greater vegetable diet among people of middle age and they are the people who have their hands on the money.

I am of course aware that many here come from parts of the State which are too frequently visited by frosts to have the same interest in strictly tropical plants which the citizens of Miami and vicinity have but the question of frost and protection from it is connected with every agriculture no matter where you travel on the earth's surface.

What are the horticulturists trying to do on the bleak plains of Canada? Produce a plum which will ripen before the frost can get it in September. What are the almond growers of California staying up nights for? Waiting to see if the late spring frost has killed their Jordan almond blossoms and spared their IXL

variety. What is the experiment station in Luleo, Sweden, doing? By extensive breeding experiments, trying to produce a shorter season barley for Lapland.

So, although most of us try to push into the background, when we talk with Northerners, the question of frost, instead of admitting that it is a factor connected with all agriculture except that actually below the isotherm of 32 F., it is a fact that Florida horticulturists will always be striving to produce hardier forms which can be grown farther north; and that with their production will come wider areas of their cultivation just as the production by Prof. Saunders of the early-maturing Marquis wheat by hybridization and selection extended the area of this cereal tremendously in the Canadian Northwest.

But still, what has all this to do with horticulture and its development in the real tropics? Just this. The tremendous stimulus of a great people of 100,000,000 consuming the horticultural products of the tropics. Nothing great that I know of started large. It had its little beginning. I had the pleasure in 1898 of talking with Captain Baker in Port Antonio and of hearing from his own lips the story of his first schooner load of frying pans which he took to the West Indies and of how in desperation he bought a load of bananas and peddled them in Boston. The banana was so rare a fruit in Germany and France in 1895 that three of us American students in Bonn disgraced ourselves by laughing out loud in the course of a serious botanical dissertation of how to eat one. The great American public took up the banana. It

would have it. It was willing to pay money for it and the satisfying of this demand has had a greater influence on tropical horticulture than almost anything else since the discovery of the uses of the juice of the rubber tree.

As our fathers and mothers were in at the beginning of the banana so we here today are standing at the threshold of another tropical industry which in magnitude may in the lifetime of some here rival that of the banana itself. I refer to the avocado.

But there are many who will talk here of that remarkable fruit and I shall only allude to it to help me prove what I started out to prove to you—that the pioneer work in tropical horticulture is here and not somewhere off in the sweltering, malaria-infested lowlands, or even on the isolated, inaccessible slopes of some tropical volcano, alluring as those places most certainly are to the collector and the laboratory research man.

If the tropics is the place where tropical horticulture will develop why is it that there is not a single large orchard of *budded* avocados anywhere in the West Indies or Central America whereas there are hundreds of acres of them here?

But someone will say I have chosen as an example a fruit with which California has done more than Florida, which is true. But my explanation of the reason is that California has had the wealth and the people.

But let us take a more strictly tropical species, the mango, and see what the situation there is. It is one of the most highly prized fruits of India. I have discussed its varieties with the wealthiest

Parsee of that vast country, sitting in his marble palace as he gave me the promise of plants of his best sorts. Its culture there is centuries old and the Mahrad Jas fostered its cultivation and built up variety collections, but they did little to study its diseases and nothing which we can discover to produce by careful breeding and selection the finest varieties of which the species is capable. No such question as that of the best stock on which to graft or bud it had been worked out and even the old and expensive system of inarching was the only known method of its propagation in vogue there. With millions of square miles of territory where giant mango trees could be grown in the tropics of the Western Hemisphere was it not to be expected that there would have developed orchards of the finest varieties to be found in India? Varieties without any fiber which could be eaten as easily as a canteloupe? We have searched the tropics of South America and Central America in vain. The finest mango of Brazil (Mango de Rosa) is too full of fiber to merit classing as even a fair variety. The call has come in from these countries for the fine Florida mangos such as that remarkable seedling, the Hayden, than which there is none approaching it in commercial character, and thousands of budded plants of these and our imported varieties have been sent into the western tropics.

Some of you perhaps know the struggle which resulted in the saving of the mother of the Hayden, the Mulgoba. It would be hard to imagine such a struggle and such patience over a new variety of fruit inside the tropics. I wish I could

read to you one of the last letters of that early pioneer, Prof. Gale, which he wrote to me after, for the third time, his Mulgoba mango (the only tree in America) had been killed to the ground. I asked him if he wasn't discouraged and he came back with that optimism which seems to be characteristic of the old fighting American stocks of eighty years, saying that now he felt convinced that Mango growing was going to be an industry in South Florida. I think of that letter when I see thousands of budded Hayden mangos and hear the accounts of big profits from single trees which were made last year.

But I have a more serious undertaking than would be indicated by such examples as the Mulgoba mango. These are days when the question of a food supply is uppermost in people's minds, particularly the minds of the legislators.

I sat one afternoon in the woods of Maryland with Mr. Hoover. It was just after the crisis had been passed with regard to our supply of quinine and we had suddenly realized that Holland had a complete monopoly of that indispensable drug. I was tremendously interested in Mr. Hoover's conception of the growing importance of the tropical food supply and of the speed with which other countries were pushing into them in search of the vast wealth which lies in those vegetable oils which every year in immense quantities can be produced there. His long experience in tropical countries has made him realize their tremendous potentiality and I shall miss my guess if he does not bring into a prominence which

few here realize the great future for Americans in its exploitation.

The discovery of a use for a tropical raw material is the first step in its exploitation is it not? How are new uses discovered? By the action of those intellects which through experience in a certain field have come to know what is needed in that field, in another way. The presence of the intellects is as necessary as the presence of the raw material and here is where Florida comes in. She has the people. She has coming here every winter hundreds of thousands of people who spend their lives in close touch with the most specialized industries in America. Men who have made their fortunes by discoveries. These men are scattering out all over the country getting the only kind of rest which such men take—a change of interest. Why is it unreasonable to suppose that with the bringing in around them of all sorts of these tropical plants their attention should be attracted to their possibilities, and out of their interest in them come the development of a demand for them which will extend into the tropics and lead to a great tropical industry?

These things do not seem so speculative to me as they perhaps would had I not stood with Ridley in his first little plantation of Para rubber and caught in a mustard tin the latex which hardened into an eraser which I still use and which every time I do use it reminds me of the fact that since I caught that juice over 500,000 acres have been planted to that tree, many coming from seeds from that very tree; and that after supplying every motor car with a tire the juice is still



flowing from these half million acres of trees and a Dutch representative from Java has come to suggest that we make rubber carpets and rubber roofs out of the juice in order to utilize it. The tropical jungles of the Amazon were filled with that para rubber tree, but plantations of it in the Orient have made jungle rubber unprofitable.

It is in these little beginnings that the government can and is helping you pioneers of tropical horticulture.

The Office of Foreign Seed and Plant Introduction with which I have had the pleasure of being connected for twenty-three years is that branch of the Department of Agriculture, which concerns itself with these little beginnings. It hunts for plants in various parts of the world, sending out trained agricultural explorers and through its hundreds of correspondents getting in living material at the rate of about 2,000 things a year. I would like to present to you on the screen some of these agricultural explorers. They are not accustomed to appearing in public. The public does not yet accord them the honor which it gives to more spectacular explorers. A man who can dance a prettier dance or throw a swifter ball or kick a higher kick or punch harder will figure large in the newspapers; whereas the man who makes a new plant grow where none grew before or who even creates through hybridization an entirely new fruit is "just another plant crank" in the eyes of the so called public. I suppose the world will always be lured by the spectacular at least for many generations to come. It is its way.

But let me select a few of those little beginnings of tropical horticulture which would develop fast if the public were as quick to take up new things as those of us who are interested in the new things themselves could wish it were. And here is where the great mission of Florida comes in. If the people of Florida could only see that by the cultivation of a spirit of progressiveness and open-mindedness they might have here more new and novel foods with which to interest those coming from the North than any other State in the Union. In my imagination I can hear this kind of a conversation between a Florida business man and a stranger. "What, didn't you taste a Papaya while you were in Florida? Don't you know the Sapodilla? Or that new hybrid fruit the Tangelo? Or the delicious drink made of the Rangpur Lime and the Persian Lime combined? Or have Dasheen crisps for breakfast? Or make your lunch of an Avocado? Or taste frosted cake with fresh shredded coconut on it? Or wait long enough to eat a White Sapote? You never even heard of pigeon peas and Hopping John and bonavist pea soup and fresh cassava pudding? Well, what is the use of going to a place where all sorts of new things to eat can be had and not tasting them? You must have lived in one of the hotels which cater to the provincial northern taste with a French chef and a characterless menu." The northerner might reply that he didn't like new things anyhow but he would have a guilty feeling nevertheless.

No, the thing to do, it seems to me, is to look at every new plant which will

grow here from the standpoint of its possible utilization by the millions of people north of us. If it has a beautiful flower can it be grown here, shipped north and forced there, can its flowers be sent north and sold, has it a new perfume which might become popular? If a new vine, could young plants be sent north and used as porch vines during the summer or would it grow outdoors and form a window decoration? If it is a fruit what season would it be possible to get it into the hands of your friends in the north? Will it carry well? Has its juice new possibilities of utilization? Is it a better keeper than those with which it will compete? If it is a new vegetable what are its advantages? Some of its preparations may prove better than those of its competitors.

It may have a pleasant flavor after being thrice cooked and be just the vegetable that diabetics are looking for and which will prolong the lives of thousands by its introduction. Think how many men and women are now eating under doctors' prescriptions a sea weed—agar agar. Supposing that it should be possible to create a fashion for it which would make it supplant spinach and that it were a safer crop than spinach to grow here. The inhabitants of northern Celobes eat the leaves of the Papaya and throw the fruits to the hogs. Dr. Powers investigated these leaves and finds they contain carpain in large amounts but I have after cooking the leaves until all bitterness is gone eaten them without injury. In Yucatan there is a tree which grows here luxuriantly and which there supplies delicate greens throughout the summer.

But I know men here in the audience who are saying, "Yes, but it's such a slow business." One real estate man said to me "Let's try something easier." A friend of mine who made 8,000 limousines, after hearing my enthusiastic account how after ten years we had gotten a new vegetable started, scornfully remarked, "Yes, but ten years is an awfully long time." I admit all this. I see the difficulties which present themselves to the minds of those who would hurry through life, but I also have in mind the small amounts of money which are going into this exploitation of new food plants. The government has not spent on all of the work of this introduction of plants that has been carried on for nearly a quarter of a century as much as \$2,000,000 for the whole period and yet last year those growing these introduced plants made \$89,000,000 out of their culture. At the present time there are thousands of individual incomes which are greater than the \$125,000 which is going into this work next year and of this sum only a small fraction can be used in the exploitation of new foods. The main expenditure must still go into the securing of new plants and their distribution to those who will bring them to a point where individual initiative will exploit them.

There is another side to this big problem. It is intimately connected with creating a demand, a taste for a new tropical food. Supposing Captain Baker had taken a liking to the West Indian Mangos which are all seedlings and instead of the banana had brought that in. Is it imaginable that he could have created a liking

for it and built up a big business with it? I cannot imagine it. The introduction of the delicious Mulgoba and other fiberless sorts and their further improvement in the Hayden is what is acquainting the great American public with the excellencies of that incomparably delicious fruit. And when Americans once really go after the mango and it becomes a million-dollar industry, its beginnings will trace right back to the shores of Lake Worth and Biscayne Bay, just as the first days of the grapefruit, which is today as much talked about in France as the banana was a generation ago, were spent here in the south tip of Florida.

Why, I once had the pleasure on a railway Pullman of presenting a Florida-grown mango of a variety which the great Parsee Tatta had given me, to the millionaire of Cleveland who had escorted Tatta through this country when he visited America. He had volunteered the remark that he had been through India and he considered the mango a much over-rated fruit. He opened and ate the Florida-grown Amini mango and declared, as any honest man would, "I must never have eaten a good one."

Most of the objection in the minds of the public to what they call tropical fruit is to poor seedling varieties of it. Over half of those who don't like them have never eaten the selected superior types of those fruits which you pioneers are bringing into existence through your art. We cannot blame the public so long as we give them only rank flavored seedlings, and when we once give them the best of their kinds they will come after them with the money fast enough.

It is in a very real sense then that you are the pioneers of tropical horticulture, for it is to you that a public of a hundred millions is looking for the perfection of these bewilderingly fascinating new forms of plants which inhabit the great forests and savannahs of the tropical zone.

So those who have come here to live should let nobody belittle the mission of Florida. To look upon what you do here as affecting only a narrow sand spit—a sand bar as it were out into the Gulf of Mexico—is to forget that what you do here to improve the plants and popularize them affects the whole American consuming public by creating a demand which, as our population increases, will draw first on Florida soils and later on the whole available tropics.

Is it not worth while to teach a hundred million people to like a fruit which can be grown cheaply over millions of acres of inexhaustible volcanic lands where the sunlight and moisture make the fruiting of it a perpetual performance?

Is it nothing to so improve a fruit or nut or vegetable that its use by a great people is made possible and its culture stimulated in regions which never could have been devoted to the cultivation of the wild form of it?

Is it nothing to build up a body of trained and enthusiastic men and women from which will be recruited those who, as opportunity comes, will go out into the wider strictly tropical field prepared to accomplish something worth while before the malaria and other diseases pull them down to that dead level of existence which almost every white resident



complains of as the drawback of the tropics?

The machinery is working which will bring in the plants for the horticulturists. It is woefully inadequate, I know better than you do, but at least it is functioning. But where are the plant breeders and plant breeding gardens and institutions where the arts of tropical horticulture are taught to the young men and women who are growing up here?

A great opportunity is here for the establishment of an Institute of Tropical Horticulture which shall become a real center of learning with respect to the problems of the tropics.

Florida's isolation with a zone of cold land on the north and the sea on the south should make it possible to keep her free from the swarm of tropical diseases and insect pests which has already overwhelmed Hawaii and is rapidly sweeping Cuba and Porto Rico and the other West Indian Islands. I was shown the other day a photographic calendar from Hawaii of one of those coconut-planted beaches and to my dismay I realized that the beauty of those Hawaiian palms had departed. A leaf moth has converted them into a lot of worn out feather dusters. Here is one spot where with intelligence and money we can have cultures of tropical plants free from disease or at least where the diseases will be under control.

And here I come to one of the most amazing performances, one of the gigantic gifts to the world which you pioneers of Florida have given.

I know some of you will not agree with me. I fear some of you have been back-

ward in recognizing the value of the contribution. Some of you may still be antagonistic towards those who brought the conditions into existence because they abridge your individual rights and hamper you in your individual ambitions.

But if I had only the command of language I would love to put this accomplishment before you so that you could not fail to appreciate it.

To one who as an orchid hunter wanders through the jungles of Java with its hundred and eighty inches of rainfall, every leaf seems clean and every tree free from disease; but a closer inspection will teach you that where the trees and plants grow there grow their fungus diseases and the insect pests. As long ago as 1895, when I was first there the Dutch had been so aroused by the complete destruction of the Java coffee plantations by the leaf disease that Treub, the great director of the Botanic Gardens, was building an Experiment Station after the pattern of our American ones in order to study the diseases of the tropical crops of the archipelago.

Here in Florida where you have such a large body of intelligent plant growers you have done with the aid of funds which a public living far away from you has in part supplied, an amazing thing. You have stamped out one of the deadliest and most easily communicated of plant diseases by your combined efforts. You have shown that the thing is possible. Can you imagine such a thing being done anywhere else—anywhere where there was not an intelligent public and easy means of communication?

Have you forgotten that it was the entomologists and their knowledge which made the building of the Panama Canal possible? Cannot you see that the discoveries which led up to the control of the mosquito, like the discoveries which led up to the building of the first dynamo will be talked of long after the greatest engineering feat which was made possible by it have been forgotten?

To have controlled a virulent plant disease! Look at it from the angle of the future. Go to Hawaii and see what the uncontrolled gathering of plants from all over the tropical world led to and how impossible it has been found to eradicate such pests as the fruit fly.

You, pioneers of tropical horticulture, have shown the vision. Men like your own neighbors here have seen the hand-writing on the wall of your gardens. They have seen how easily your wonderful gardens would fade; how the unequal fight with the invisible, but none the less destructive monsters from the tropical jungles, are swarming over your garden walls and will overrun your plantations.

You may complain that they see dangers where they do not exist and undoubtedly they sometimes do, but does not any doctor see his patient from the pathological side? Are they more inclined to exaggerate than any group of enthusiasts? Will all these things not gradually regulate themselves?

You see, and I quite agree with you, that the cold water has been thrown on the individual initiative which once prompted amateurs to send all over the world for plants because of the thrills which the introduction of a new plant

brings with it. This work is now centered in a small branch of the Federal Department of Agriculture in Washington in so far at least as it relates to the out of the way parts of the world. I regret this, although perhaps I am as responsible for its coming about as anyone; but it has been for years a dream—a dream which I shall have to leave to younger hands and brains to work out—that there should be in every great section of this country trained men whose business it is to study not only the plants which are grown there, but, through extensive travel and repeated comparison, those which exist in all other parts of this planet which have similar conditions of soil and climate. The organization of a central office and the sending out of agricultural explorers from that office has been a good beginning but only a beginning.

The issues are too vast and the number of new plants too many and their study too complicated to make it possible in the brief span of a single human life to do more than touch such a field in the most superficial way. Why should it seem an extravagance for a great commonwealth to spend money on this form of research when it cannot fail to unearth forms of plants which when brought under the searching eyes and within the range of the inventive brains of thousands of amateurs like yourselves will yield new foods, produce through breeding immensely valuable immune and hardier varieties and form the basis of new and lucrative plant industries?

Let me sum up as I see them your great opportunities.

A wonderful climate for horticultural operations. An isolation which can be made a protection against the plant diseases of the tropics, and permit a degree of control of those diseases which is hardly to be hoped for anywhere else in the world. A public coming right to your groves with more money to spend than had the kings and courtiers of a few generations ago. A public, furthermore, which has not fixed its tastes on certain things to the exclusion of all others. A commonwealth filled with those restless spirits—those American pioneers—without whom this country would not be today what it is, the most rapidly evolving country in the whole world. And a mission which reaches far beyond the confines of your State—the mission of educating a hundred millions of people regarding that wealth of tropical foods and other useful plant material which lies as yet almost untouched in the tropical forests and savannahs of the world.

The opportunities are here, but you must build higher your centers of learning. Increase with all the speed you can your laboratories of research. Gather together great collections of the plants which will grow here and furnish materials for the breeders. Open the doors of opportunity for those bright eyed, curious minded, little boys and girls who today are catching butterflies and gathering snails and fishing on the keys when they are not picking fruit in your groves. It is those boys and girls who are to be the great pioneers of the tropics and if they know what they can learn of them in this State before they set sail they will be able to accomplish what they set out to do before the enervating tropical climate shall have sapped their energies and ambitions.

Ladies and gentlemen, a great future is before you.



# The Institute for Research in Tropical America

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Wilmon Newell, Gainesville

Some of you may assume, from the title of this paper, that the subject is a dry one. I can assure you that it is not, but, on the contrary, there is before us an opportunity to secure for Florida an institution which not only promises to greatly surpass any existing institution in the southern states but one which will presently attain a world-wide distinction in the field of science, including agriculture and horticulture. I will confess, at this time, that I requested your President and Secretary to afford me the opportunity of talking to you on this subject, because I honestly believe that we have something of vital interest to this Society, and that, furthermore, this Society is the logical agency to take the initial step towards getting this institution located in Florida.

Without further preliminaries, permit me to say that within recent months—practically since the close of the World War—there has developed among scientific investigators, particularly plant pathologists, a definite movement for investigations in the tropics, pertaining not only to plant diseases, but to various lines of agricultural and horticultural work. The beginning of this movement is right here in the United States. It is not merely the expression of a desire on the part of scientists to explore the tropics along

their respective lines of research, but is the crystallization of the plans and needs of many individuals and large business interests whose financial investments in tropical countries are such as to make certain lines of scientific research a vital necessity. There are many business firms in this country that have extensive holdings in the tropics and the future success of many of their ventures is dependent upon the solution of agricultural, horticultural or biological problems. It is only natural, therefore, that such a movement, virtually international in scope, should develop at this time.

There is also great need for a more complete knowledge of the trees, plants and crops of the tropical regions than is now available, to say nothing of the fact that medical men need a knowledge of many factors which concern the origin and dissemination of tropical diseases. There is also a crying need for an institution in which students may specialize in the study of tropical problems, in order to qualify themselves for employment by business interests having investments in the tropics. And it is equally desirable that there be provided, in or by the United States, in some form, an advanced educational institution wherein students from the Latin-American countries may take advantage of the large amount of bi-

ological knowledge which has been acquired by American investigators. All of which things would be directly contributory to a closer relationship between the United States and the other American countries.

The step which led up to the organization of the Institute for Research in Tropical America was the appointment, on November 5, 1920, by the National Research Council, through its Division of Biology and Agriculture, of a "Committee on Scientific Research in The Philippines and Other Tropical Countries." On November 19, 1920, this committee reported to the National Research Council that, as a result of its investigations, it had found a number of Philippine problems demanding prompt solution, most of which vitally concern and are closely identified with important commercial ventures, the headquarters of which are in the United States. One step followed another in rapid succession and "The Institute for Research in Tropical America" was formally organized on January 15, 1921. The President of the institute is Dr. A. S. Hitchcock, personally known to many of you, and the Secretary-Treasurer is Dr. G. R. Lyman of the Bureau of Plant Industry, United States Department of Agriculture.

Now, what is this Institute? It is an institution for research in tropical America and its field embraces biology in its broadest sense, including agriculture, horticulture, plant breeding, bacteriology, entomology, plant pathology, etc. It is being sponsored by and organized under the auspices of the National Research Council, a sufficient guarantee of its

earnestness of purpose and efficiency of operation.

By the way, some of you may not clearly recall what the National Research Council is. The Council was organized in 1916 to co-ordinate the research facilities of this country for work on war problems and in 1918, by executive order of the President of the United States, it was reorganized as a permanent body. Its essential purpose is the promotion of scientific research and of the application and dissemination of scientific knowledge for the benefit of the national strength and well-being. It is virtually a Congress of the leading scientists and scientific institutions of the United States—a co-ordinating clearing house for scientific knowledge. Its administrative work is provided for by a gift of five million dollars made by the Carnegie Corporation and it has secured various gifts for the support of projects which it has sponsored, including a gift, for Research Fellowships, of five hundred thousand dollars from the Rockefeller Foundation.

The membership of the Institute for Research in Tropical America is open to all Universities, Colleges, Museums, Scientific societies and even governments that are concerned with investigations in tropical countries. How will it be financed? Partially with the funds of the institutions, both educational and research, that constitute its membership; partially by the federal support of projects which the institute undertakes and in which the government is interested; and by endowments, for, be it noted, the responsible character of the institute and

its ability will justify the utmost confidence in it by those inclined to donate funds for scientific investigation. The heaviest financial backers of the institute will undoubtedly be the big American business interests having investments in Latin America. In short, the institution will be, in a sense, a super-university and a super-experiment station and its field of operations will embrace all of tropical and sub-tropical America. Have I been able to sufficiently express the big idea?

The institute will doubtless have field stations, particularly in the countries south of us, but one thing is sure, there will be a parent station bigger than all the rest which will, also, presumably be the first one established. Where is this main station—the virtual headquarters of The Institute for Tropical Research—going to be located? Nobody knows, as yet, and right here is where Florida is mightily interested. In the southern portion of this State we have conditions sufficiently tropical to permit of successfully carrying on many, very many, of the lines of investigation projected by the Institute—and there are certain self-evident advantages in having this main station under the flag of the good old U. S. A. I am satisfied that if we go at it vigorously we can convince the officials of the institute that their headquarters should be right here in Florida. This much will, I think, be comparatively easy, but we must go further. In order to get this institution we must make a definite offer in the form of land for experimental purposes and perhaps money for the erection and equipment of a building. Once these things are provided, the United

States Department of Agriculture will be free to send its various specialists to this field station to pursue their respective lines of investigation and professors and investigators from various Universities will be quick to take advantage of the laboratory facilities provided. It has been suggested that this first or main field station should be even more than a laboratory or experimental station and that it should, in fact, be also a postgraduate school of tropical agriculture and horticulture, perhaps under the auspices of the University of Florida. I need not tell you what a prestige such an arrangement would give to our own University.

I am well aware that I have said just enough so that I should say more, but this I cannot do, for the institute, while not exactly in a formative stage, is still in its infancy and detailed plans for its operations have not yet been worked out. But the institute is a reality—some sixteen or seventeen big Universities have already associated themselves with it—and it is going to be located either in some of the countries south of us, or in Florida. The question is, what are we going to do about it? Are we going to let this opportunity slip by or are we going after this lusty infant and capture it before it gets so big that it will spurn any advances we may make? It is up to the people of Florida and I know of no more appropriate agency to handle this matter than the State Horticultural Society, for there is no other organization in the State the aims and purposes of which are so closely akin to those of the Institute for Research in Tropical America. If the idea of getting this institution located in Florida appeals



to you my suggestion would be that a live committee be appointed from this Society to investigate and, with the Society's approval, take whatever steps may be necessary to induce the officials of the institute to locate their main institution in Florida.

# Grass Culture as Applied to Golf Course Construction in Florida

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Jos. R. Brooks, Palm Beach

It is difficult to realize the great popularity of the game of golf. It is now played nearly all over the world. For several centuries it has been a favorite in Scotland and England and its popularity is fast growing on the Continent. Belgium possesses several fine courses, the game having received impetus and royal patronage from Leopold II, of whom the following story is told.

His Majesty was one day receiving a newly arrived American Ambassador, and in the course of the conversation happened to ask him what he thought of the country. The representative of the United States confessed that so far, he had not been very favorably impressed, as it had rained ever since his arrival, and worse still he found himself deprived of his favorite form of amusement, as there were no golf links. Leopold II replied that he regretted his inability to influence the weather, but that he could and would supply the remedy to the second objection. The king was as good as his word, and gave his beautiful shooting-box of Ravenstien in the Sognie Forest, for the purpose, whereupon it was transformed into the Royal Belgian Golf Club, which now has a summer course at Le Cog, a few miles from Ostend.

Nearly every large city in this country now has many golf courses, Chicago alone having more than fifty in the city and its suburbs.

The great importance of golf in this State lies in the fact that it is the most popular pastime of tourists. One of our best known hotel men recently said that if golf did not constitute the backbone of the resort hotel business, it formed at least a large portion of the vertebrae. Some of the oldest resort hotels in this State have within the last few years found it advisable to make very large investments in golf courses in order to retain their patronage. The total investment in golf in Florida already runs well into the millions and is very rapidly increasing.

Enough has been said to indicate that the construction of good golf courses has been and will continue to be, an important aid to the development of this State. Every member of this Society has therefore, an interest in this game whether he be a player or not.

The cost of production and maintenance of a fine turf on any course may depend very largely on the selection of the site. It is always essential to have an abundance of good water, and when a site can be obtained which also contains

a variety of good soils, such as sandy loam, clay and muck, the cost of construction and maintenance is much lowered.

The methods pursued in construction have a most important bearing on the quality of the turf produced, the cost of producing it, and on the cost of the future maintenance of the course. In the construction of greens, tees, bunkers, mounds, traps, in the cutting or filling of fairways, and in any other work in which the natural lay of the soil is disturbed, it is most important that the top soil be replaced on the top, and not buried with the soil from below the surface; for most of our Florida soils are light and the top strata only is capable of supporting a vigorous growth of turf. Scattering or burying of top soil in construction work will result in poor turf, which condition can be remedied only in two ways; either by heavy fertilization, which is expensive, and affords only temporary relief, or by bringing in top soil from elsewhere to supply the deficiency, which is a very expensive process.

The building of a fairway consists briefly in four operations; first clearing and grubbing the land; second, draining where necessary; third, plowing and harrowing; and fourth, planting the grass.

The first operation needs no further mention except that the grubbing should be so thorough that palmetto, compte and similar growth will not be liable to spring up in the fairways after the grass is planted.

In some places a considerable drainage system may be required. On flat ground, slight depressions may be excavated with just sufficient grade to carry

the excess water away rapidly. These may have side slopes sufficiently gentle to cause no inconvenience to the player, after they have been covered with turf. The use of these grassy hollows in connection with lines of drain tile will solve most drainage problems in a satisfactory manner.

After the drainage has been provided for, the soil should be prepared for grass planting by thoroughly pulverizing it to a depth of about five inches. I have built fairways where this latter work had to be done mostly with a road roller and a scarifier, but it is certainly much preferable to build them where the land may be properly prepared with a tractor, a plow, a harrow, a pulverizer and a drag. Too deep plowing should be guarded against, especially where the soil is very light and practically all of the plant food is very near the surface. It is well to emphasize that all soils should be thoroughly cleaned of trash before planting and that heavy soils cannot be too finely pulverized.

Very little of what has been written in books on golf construction relative to turf culture, will apply to conditions in this State. For instance, we are almost invariably directed to use fertilizer or humus or both on newly cleared land before planting grass. On the heavier newly cleared soils Bermuda grass will produce a good turf without fertilizer for the first two or three years, after which some fertilization will be required to maintain a healthy growth and a good color. The lighter soils are seldom too light or too poor to produce a good growth of Bermuda for at least the first season after clear-



ing. These lighter soils do not afford what golfers term "a good stance" or foothold, no matter how heavily fertilized. Moreover, if heavily fertilized, a large proportion of the fertilizer leaches away in these lighter soils, before the grass can get the benefit of it. In order to meet these two difficulties, a layer of stiff, heavy soil, one to two inches in thickness, preferably clay, should be spread over the ground, after a good stand of Bermuda has been obtained. It is essential that this layer of clay or heavy soil, be kept en masse and not mixed with the lighter natural soil of the fairway. It will thus form a sort of mat which will give the player an excellent footing, hold down the lighter soil, and retain any fertilizer which may in the future be applied. The Bermuda grass will rapidly penetrate this mat and will form a heavy turf.

Bermuda grass forms the turf on at least three quarters of the area of most of our links. Its greatest advantages are ease of propagation and rapid turf-forming properties. The grass is most successfully planted vegetatively, the common process being to scalp off the tops of mature grass slightly below the surface of the ground; run these through a feed cutter, or chop them up with matchetes, and drop the cuttings in furrows, and cover. If a thick turf is desired in a minimum time, the furrows may be so closely spaced that each one will cover the one before it. A fairway so planted in clay soil on the Miami Country Club links was covered with a good playable turf in ninety days. On heavy soil, good results may be obtained more cheaply by broadcasting the chopped grass on the

prepared land and disking it in. A period of hot dry weather following the planting by this latter method, however, is liable to result in a very poor stand of grass.

On the newer portion of the Miami Country Club course, about half the area is marl prairie and the remainder sandy pine land. Practically all of this portion of the links was carefully prepared for planting before any planting was started. By this procedure work was very economically accomplished, as a planting gang once organized and started, never ceased operations until the whole area was planted. The heavy marl lands were worked on in the dry weather, and wherever frequent showers made the sandy pine lands sufficiently moist, the planting gang was transferred to them. In this way a fine turf was produced over the whole area with no watering whatever.

On most of our soils, Bermuda grass will require considerable weeding and at least two good applications of fertilizer per year. It can probably be best maintained if completely plowed under every second or third year and a new growth allowed to come back from the root stocks in the soil. This process prevents the grass from becoming rootbound, cultivates the soil and destroys many of the weeds.

*St. Lucie Grass* is similar to Bermuda in appearance except that it is a little coarser and of a lighter color. It is much more easily destroyed than Bermuda, will often die if allowed to grow high and burned off; or sometimes, after a rank growth is obtained, it will not spring again from the roots after having been

cut close to the ground. St. Lucie runs more to tops and less to root system than Bermuda. The latter is much preferable for fairways.

*St. Augustine Grass* is coarser than St. Lucie and still lighter in color. It makes an excellent turf for fairways if kept closely cut. It is a more vigorous and thrifty grower, once started, than either the Bermuda or St. Lucie. Under favorable conditions, it will crowd out all other grasses and weeds. This grass has produced an excellent turf on very poor soils, absolutely without fertilizer, where the ground water level was approximately three feet below the surface.

It is, however, more difficult to propagate than Bermuda and is seldom planted in the original construction of a course. After a turf of Bermuda grass has been obtained over the entire course, one of the surest ways of cutting maintenance costs is to plant small individual sods of St. Augustine grass from ten to twenty feet apart in each direction on all portions of the links favorable to its growth. Within two to four years, the St. Augustine will have taken possession of all those areas where the ground water is sufficiently near the surface. Such areas once covered with St. Augustine grass present no further maintenance problems save cutting and the use of tobacco dust when necessary to kill the cinch bugs which attack it at times.

The putting greens are of prime importance on a golf course, for though they usually comprise less than five per cent of the total area, approximately fifty per cent of all the strokes are played on the greens and it is here that the in-

terest of each hole should reach its climax. It is, therefore, advisable that the greens be made as perfect as possible, cutting expenditures elsewhere if necessary to accomplish this result.

*Clay Greens* are sometimes used, surrounded by a very carefully kept area of grass which might be said to serve as a part of the green, but the grass greens are so much preferred by the great majority of golfers that clay greens should be considered only where, as in some localities, adverse climatic conditions, or exceedingly heavy play, or both, make grass greens inadvisable.

From the golfing point of view, there are two important objections to the use of Bermuda grass for turf on putting greens. It is a little too coarse and the runners which it continuously puts out, divert the ball, making accurate putting impossible.

The first objection results in what golfers call a "slow green," which is perhaps comparable to what race track fans call a "heavy track," and makes it necessary to hit the ball a much harder blow to make a putt of a given length than would be required on a finer turf. The very finest bladed turf which can be obtained is the most desirable.

The second objection may be at least partly overcome by continually cutting off and pulling up the runners, or by constantly mulching up the green to cover the runners. Both of these processes are of course expensive, and in my experience, not altogether satisfactory.

So far as I know, it was at Belleair that the first attempt was made in this State to get away from the use of straight

Bermuda grass greens. The green building process as used there some years ago was as follows: The greens were covered with a growth of Bermuda grass, and during the summer when the course was not in use, the Bermuda was as carefully maintained as if being played on, as it was desired to keep the Bermuda grass turf as a foundation for the green.

About the first of October the knives of the mowing machines were set low and the grass cut very short. Each green was then fertilized with 500 pounds of tankage and the fertilizer watered well into the soil. The greens were then sowed with about seventy-five pounds of Italian Rye grass seed and top dressed with sufficient good compost to thoroughly cover all of the seed. The ground was kept moist during the period of germination, was rolled slightly before the first cutting of the grass, and the grass was cut just as soon as tall enough for the mower to catch it.

This general process with variations, has been since followed on the links of the St. Augustine Country Club and on those of the Ormond Beach course. At present a mixture of Red Top, Red Fescue, and Italian Rye is used instead of Rye only on these two courses.

During seasons of average temperature this practice produces excellent greens at these localities, for it is usually cold enough to retard the growth of the Bermuda sufficiently so that it scarcely appears on the surface of the green at all until late in the season, when it begins to crowd out or smother the other grasses, making the green slower and coarser. The warmer the winter season, the more

quickly the Bermuda takes possession of the green, and the colder it is the more its appearance is retarded.

At the Palm Beach Country Club course, on the other hand, the same process resulted about February first in greens entirely of Bermuda grass with its objectionable features. This, of course, was due to the fact that the average temperature at Palm Beach is several degrees higher than that at Ormond Beach or St. Augustine. It was therefore necessary to retard somewhat further the appearance of the Bermuda grass.

This was attempted by scalping the whole green with a weeding hoe, removing the grass tops entirely and leaving only the masses of roots undisturbed in the ground as the foundation for the green. The mulching was then spread on, and the green seeded as before. This treatment did cause a somewhat later appearance of the Bermuda grass, but not sufficiently so; as the fertilizer and water which were necessary to force the growth of the seed, together with the mild winter climate at Palm Beach, resulted in a Bermuda grass green before the season was half over.

The next step was to do away with the Bermuda grass foundation entirely and depend altogether upon producing a turf of northern grasses, strong enough to stand the wear and tear of a putting green. This had not previously been thought possible as it was impracticable to sow the grass seed until October, the sun being so hot before that time that it would kill the grass soon after germination. The results of this latter method were so successful at the Palm Beach



Country Club course that it has been followed there ever since first tried about three years ago. The greens at the Everglades Club at Palm Beach and those at the Miami Country Club are produced in the same manner.

In order to keep a golf green in a high state of perfection, constant watching is required and the greens keeper has many difficult problems to solve. For instance, on the Miami Country Club links the greens were at times affected by what has been termed "damp off" or "die back." Fertilizers and fungicides of many kinds were tried to correct this but with very indifferent success. The appearance of this disease was peculiar and interesting. It was liable to be found particularly on a damp, foggy morning, of which variety we do have one or two occasionally in Miami, boosts to the contrary. Very early in the morning a few small spots of thick white watery looking material would be found on the grass. These would more or less dry up and disappear as the sun mounted higher, but around them the grass in a circle as true as if drawn with a compass, would lie down like dead. I have seen a dozen or more such circles on a single green, varying in size from a few inches to a

couple of feet in diameter. A solution of sulphate of ammonia or nitrate of soda would sometimes partially revive this apparently dead grass. Finally an expert from one of the best known New York seed houses came down, examined the greens, pronounced them too highly ammoniated, and advised the application of acid phosphate. This was applied as greens were not treated. In a week the directed except that two of the afflicted greens had all recovered, treated and untreated alike, so the dieback still has us guessing.

An interesting attempt is now being made here by the Miami Golf Club to keep nine of the greens of the Miami Country Club playable during the next few months. Heretofore, as far as I greens of the northern grasses playable know, there has been no attempt to keep during the summer months in Florida. It may be possible to keep them in fair shape for a couple of months if the weather is not too hot, provided night watering only is done and the grass be cut high enough to give the roots good shade.

I wish to acknowledge my indebtedness to Mr. Wm. Fremd for some of the facts used in preparation of this paper.

# The Golf Course at Mountain Lake

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R. H. Linderman, Lake Wales

Mr. Floyd has requested me, in preparing this paper, to try and give such information as would apply to lawns, generally, and I have tried to do so, mentioning our golf course at Mountain Lake only at such times as the methods practised there, might be of use to private lawn owners.

The first nine holes of our course were constructed during the season of 1916, with fairly good results. The second nine, making a complete eighteen-hole course, was built in 1920, with splendid results, owing, largely, to good seasonal conditions and our previous experiences. The entire course was laid out by Mr. Seth J. Raynor, a noted golf architect of New York City. All that we had to do, was the construction work. That is enough history I believe, for this paper, but a great deal more could be said if a true biography of the course were demanded.

In preparing land for grass, the methods used, and the thoroughness of preparation differs in no way to the preparing of ground for potatoes, a citrus grove, or any other commercial planting. I believe that I am correct in saying, that the great trouble with the average person in planting a lawn, or large acreage, to grass, is that he does not take into consideration the very important fact that his

crop will need caring for, in the way of fertilizer, water, etc., exactly the same as his commercial crop. One fertilizes orange trees, gardens, etc., at certain periods during their development, so why not do the same with a lawn and get the most from one's work in like proportion that you endeavor to get from the commercial crop.

I believe that it might be interesting to know of the methods used at Mountain Lake, if only for their criticism, so, with your permission, I will outline each step, hurriedly, starting with the preparation of the ground. This same routine can, and is, used to advantage by the man who only plants a small area.

After thoroughly clearing, our ground is plowed with a tractor and three-disc plow, as deeply as six or seven inches, which will get most of that under-ground growth, called gopher-root. The roots that are thus exposed, are then picked up by hand, burned, and the soil thoroughly pulverized with the disc and the Acme harrow. Whether the land will need the second plowing depends on the condition after this final harrowing. One plowing is usually sufficient in our local sandy soil.

The next step is, to get the Bermuda, St. Augustine or other grass roots, that we have decided to use for our lawn. We

have found that the most economical way of digging these roots, is to have a one or two horse plow precede a crew of men armed with ordinary potato hooks, with which to turn the furrows and shake the loose soil from the plants, so that, with an additional shaking with a fork when loading on the wagon or truck, the grass roots are practically free from soil. The plants are then brought where they are to be planted and thoroughly watered, or, if water is available where the grass is dug, it is always advisable to wet them at once, although this adds considerably to the weight, in carting.

Whether the fertilizer to be used is commercial or barn-yard, can only be determined by each one, after considering the cost of each, availability and the needs of the soil. The soil which shows a good native cover crop, requires less of the organic matter than one that is barren and lifeless. If we should decide on the stable manure, and there is nothing better, it is a very good time to apply this, immediately preceding the planting of the grass roots, so that it can be plowed in with them.

There are several methods of planting that can be followed, greatly depending on the acreage to be covered. For the small area, a forked orange tree stake, a lath, both sharpened at one end, or a small hand plow, can be used, but for the large area, the old reliable mule and plow will give the best results.

The thickness in planting the grass roots, can only be determined by the results desired. One can skip a furrow or plant in every furrow, depending on how long he wants to wait for his lawn, or

how soon he wants to get through with his work. We plant in every furrow, tearing the roots apart so that they will cover as much ground as possible, laying them, practically, continuously in the furrow. The grass needs only to be covered, thoroughly, and I do not believe that there is any specific depth that could be recommended, although we try to cover the roots at least, two or three inches, running the plow only deep enough to hold the furrow.

After the grass is planted, the fertilizer, if commercial, is applied, the ground smoothed and rolled, this smoothing and rolling serving to mix the fertilizer with the soil. This last year, we applied a formula analyzing 4-7-1, derived from nitrate of soda and sulphate of ammonia, cotton seed meal, goat manure, Peruvian guano, super-phosphate and ground tobacco stems, at the rate of 1,200 pounds per acre, making a second application in sixty days of a smaller quantity per acre. On grass that was planted on August 15, we had a perfect stand by the first of December. There are, of course, different formulas, and one need only ask any reputable fertilizer concern, or their representative, for advice, to determine what to use.

In watering lawns, it is always advisable, as far as possible, to do this either in the early morning or late in the evening, when the heat of the sun is not nearly as liable to burn the wet tender grasses, as would be the case if the watering were done during the heat of the day. Then, too, the evaporation is less at these stated periods, than at mid-day.



If one wants the effect of a deep rich lawn, in winter, similar to some of the best lawns in the north in summer, Italian Rye seed, broadcasted on the Bermuda turf and covered lightly with a top-dressing of soil, will, in about two or three weeks, if kept moist, give you the results desired.

It has been stated in bulletins, and papers, previously, that a periodical renovating of Bermuda sod, is very beneficial, and in our experience, this statement has been proven. We try, about every two or three years, to plow or disc our Bermuda sod, judging by the condition of the grass to determine when this is necessary. This renovating is particularly necessary in our high pine land, where the grass is noticed, at the end of the period mentioned, to lose strength of growth. By turning this sod, a new and vigorous growth is invariably the result. A light application of fertilizer is very beneficial at this time.

In preparing our putting greens for the winter season, we mow them as closely as possible, to the ground, letting the cut-

tings drop. This is usually done by the first of November. We then fertilize them thoroughly and get them reasonably moist, following immediately with Italian Rye Seed and Red Top, the latter giving a much finer texture to the green than the Rye, alone.

Our hard work is then over, and all one has to do, is to mow, water and feed them regularly, and get them in such shape that no matter how badly a golf ball is putted, it will, ultimately, fall in the cup, which, believe me, is no small undertaking, golf players, as a rule criticizing everything about a green before recognizing their own errors.

It would seem to me, that the secret, if it is such, of getting a good lawn in Florida, is the same as in the north. One would not think of planting a lawn, there, without first applying, liberally, an application of stable manure if nothing else; and here, in God's country, we surely need to give the same care and attention to one of the finest and most beautiful landscape features, possible—a well kept lawn.

# Moisture Retaining Properties of Different Soils and Its Relation to the Growth of Grasses

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John R. Van Kleeck, Kenilworth Inn, Sebring

I deem it quite an honor to be asked to deliver a paper before the State Horticultural Society of Florida on this subject of the growth of grasses. However, I feel as I felt some six or seven years ago when I was employed at the State University of Illinois. I was an instructor with the Landscape Extension Department out there and was sent into various towns in the State to lecture on the beautification of schools, lawns, etc., where it was the custom in the rural districts to call any man who came from the University, "Professor." I was sent into a small town in the southern part of Illinois and got off the train loaded down with about 300 lantern slides, a traveling lantern and a suitcase. I found several people waiting at the station, including a reporter, and a fellow came up and said, "Have you seen Professor Van Kleeck?" I said, "No, but my name is Van Kleeck and if I can fill the bill I will be glad to do so." I feel tonight, with my short experience in Florida, the same way. I know that most of you, in fact all of you, have had more experience with Florida conditions than I have and no doubt you will want to hear the experiences of a professor and I can only give you the experiences of an instructor.

A little more than a year ago I began the construction of an eighteen-hole golf course at Sebring, Florida. You can imagine my consternation after leaving northern conditions of rock, clay and loam to be cast down upon the sands of Florida. I will tell you frankly that it had me scared and some of it still has me scared, but it has been one of the most interesting problems of my life to try to cultivate grasses on these sandy soils. Perhaps some of you do not know the section around Sebring. Sebring is in the central part of the State and is quite rolling. The majority of the soil is of a yellow texture which has been or which is now used for the most successful growing of citrus fruits. On the particular piece of land which I had to work (about 400 acres), we had five separate and distinct types of soil. The problem then was the growth of grass on these five soils.

Contrary to the common belief the construction of a golf course is purely a horticultural problem. There are some engineering features, such as the design and construction of locations for greens and the proper outlining of the fairways and traps, etc. Those are purely technical features and can be constructed from plans, and have really little to do with the

construction of a golf course. The real problem is the growing and the cultivation of young grasses for the playing surfaces of the golf course. There are two playing surfaces on the golf course, fairways and greens, that constitute two different and distinct problems; but nevertheless, the main problem is the growth and the cultivation of the grasses.

In the cultivation of the grasses the one thing that has come under my observation and the one thing that I think spells success or failure is the moisture retaining properties of the soil in the course. As I have said, we had five distinct types of soil at Sebring. One was the yellow sand common in the high pine land. Another was what a lot of us know as Rosemary scrub, and those of you who don't know Rosemary scrub I don't want to introduce you to it; it has no food value that I have been able to discover. The third soil that I had to deal with is from the bottom lands and it was a muck. The fourth type was a sand soaked type that, again, I don't want to introduce to anybody; and the fifth type was the salt and pepper sand which resembles the yellow sand in composition.

Well, for the first few weeks and months, I asked questions of everybody that I could talk to in Florida, and discovered that Bermuda grass was the type of grass best suited to cultivate for the fairways and greens. Hence, I started to plant everything in Bermuda grass. In the yellow sandy soil not previously under cultivation, and which had not been disturbed in the clearing, the Bermuda grass roots planted four to six inches apart with an ordinary amount of rolling,

fertilizer and natural rains, developed a very good and substantial stand of grass. On the other hand, in the same type of soil but formerly under cultivation in orange groves, the grass planted in the same way, with the same amount of fertilizer and water gave very little growth. That was due, I believe, to the stirring of the soil to a depth of six or eight inches giving a very loose condition which held no moisture. Also the water applied by hose would quickly disappear and hence the grass would not grow. The soil here was made to grow grass only under intense applications of water and with much rolling. It is my belief that the application of water and rolling brought the soil back to a firm condition and when that was attained we got the same results as in the soil that was undisturbed.

The second type was Rosemary scrub or white sand. For a long time I could not grow a sprig of grass although I used every kind of fertilizer anybody could sell me; used all kinds of manures. I made only a slight application of water. Finally I commenced pouring the water on during the latter part of the afternoon and evening and then I began to get a growth of grass. Now, here again was a case where without an intensive and extremely steady application of water we could get but little grass. The natural condition of this type is very loose and that in a way accounts for lack of plant food in the soil. At a later date I covered the entire fairway with a stiff muck. Even though the expense of the operation prevented a complete job, still this muck added to the loose sand helped to retain the moisture in the soil and produce a



good stand of grass. That soil today still needs lots of water and will never produce a good fairway until the Bermuda grass has so permeated the soil that the water will be held there in sufficient quantities to supply the natural needs of the grass.

Now, when we came to the bottom lands we had a good type of soil. It was a black sandy muck high in plant food. I planted the grass before the rainy season and to my utter consternation after the rain was over I had no grass. The water had completely killed out the Bermuda grass roots. I constructed ditches and lowered the water table and replanted, and still the capillary action was so great in this soil that it drew the water to the surface and killed the roots again. Afterwards I began making another tour of the State and found that the old residents whom I met had discovered the facts long ago and they depended on the native grasses. Hence, I am now depending on the native grasses under these conditions. Here too much moisture in the soil spelled failure for the type of grass needed.

In the fourth type of soil or sand soak, as many call it, there was no food left in it. At least I could discover none. On stirring this sand base the grass would grow up for a time but soon the soil would pack and the grass would die out. The only solution I found for that problem was over-laying with a loose sand. Here again too much water retained in the soil had spelled defeat for Bermuda grass. In the fifth type—a black and white or salt and pepper type—the same treatment as with yellow sand produced a very good growth of grass.

The foregoing discussion dealt with the fairways alone. When it comes to the greens the conditions are changed. Most of the greens are elevated and the grass desired must be of the finest possible texture. The soil is practically all brought to the greens and we can control absolutely the type of soils for them. We cannot, however, control the water table and have to water constantly. In my first construction of greens I followed the northern procedure putting on clay and muck and then top dressed with Moore Haven muck or a light woody muck that some of you know. I used some of the Moore Haven muck with some of the yellow sand and fertilized with about 150 pounds blood and bone to each green. The grass grew in great quantities and in magnificent quality but before long I discovered that my soil was too light. It took immense quantities of water to keep the grass in good condition.

I then changed my method of procedure, cutting out the clay because I discovered that it was too sandy for the needed use, and picked out a type of stiff muck that contained a sufficient quantity of vegetable matter in a sweet condition. I used about four to six inches of this muck on my greens with no clay and after that I had no trouble. It takes a very small amount of water during the golf season and during the season when we don't have so much playing it takes water two or three times a week to keep the course in perfect condition. In some cases commercial fertilizer alone was used in dressing the top. I had a peculiar case in front of the hotel. Between the hotel and the road, a space probably 60 by 200

feet, I gave a slight application of stiff muck, probably two inches in depth. Across the road in an area about 50x400 I did not put on the muck but I gave it the same application of commercial fertilizer as I did at the hotel. Now the Bermuda grass where I had applied the muck stayed green all winter, whereas the place across the road turned brown very quickly. (Some of you who know the situation no doubt discovered Italian Rye growing directly in front of the hotel in the area where muck had been applied. In my observation the presence of the rye grass was disregarded and the Bermuda grass alone was watched. The muck no doubt held the moisture in the soil, prevented leaching and produced a wonderful stand of grass.)

Now all this has to do with golf courses but the same principles apply to every lawn in the State. One of the big problems that I see in the State of Florida is that of lawns and the main problem with lawns is that of maintenance. If I should be asked to give my opinion of the landscape features of the State of Florida, not from the standpoint of the value of plants, but from the view point of a landscape architect, I would say that the maintenance item is the thing that has been absolutely forgotten. The man in his little home who has a lawn of 20x30 feet perhaps set out in St. Augustine, St.

Lucie or Bermuda grass, as the case might be, sprinkles on a little fertilizer once a year and then proceeds to forget it. Now I think the State Horticultural Society, from the viewpoint of a landscape gardener or architect, can do more for the State in its beautification by advocating good lawns than in any other way. The soil is the main problem. If one can get good stiff muck that retains moisture, 90 per cent of your problem is solved; then with a little common sense and personal supervision of the water supply and fertilizer we can have as fine lawns as exist anywhere in the United States. The putting greens at Mountain Lake, under the supervision of Mr. Linderman, who follows me, are the best I have ever seen in the South and I believe but few of the Northern courses have the equal. You would not believe this to be a fact, but Bermuda grass with plain muck, with proper top dressing, produces finer lawn grass than any grass produced in the North. This cultivation of grasses, of course, is a great thing. We all know that England has the best lawns in the world. There is only one thing that gives them this success—moisture in the air. We have a fair amount of moisture in the air and I believe the lawns of Florida can be made as fine as anything in this country by the proper preparation of the soil and application of water and fertilizer.

# Little Known Plant Materials and Their Uses in Securing Tropical Effects

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N. A. Reasoner, Oneco

Such a subject as "Little Known Plant Materials and Their Uses in Securing Tropical Effects" naturally needs some clarification. To my mind it falls naturally into three divisions.

*First.* General remarks on Florida Climatology—for without this we would be at a loss for a definition of the "Tropical" part of the title.

*Second.* Just what is meant by "Little Known Plant Materials"? To define this unknown I must first give the known, and I have therefore prepared a table of the commoner materials, with appropriate information thereon, which I will submit with this article but not burden you with just now. Following this I have prepared some information on the more neglected materials which seem to me to offer promise but have not as yet come into general favor.

And *Thirdly*, just what is meant by "Tropical Effects"? As we are considering this from the standpoint of the layman rather than the artist it will be sufficient to mention only the more important motifs such as the Palm Motif, the Color Motif, the value of fragrance, etc.

Having therefore defined and confined my subject let us pass to the true meat of the discussion. First, Florida Climatology.

Perhaps you have already heard the joke about the East Coast and West Coast Floridians who were arguing the respective merits of their own particular sides of the peninsula—but it happens to illustrate my point so I will tell it again.

The subject under discussion was mosquitoes.

"Why, they're so thick down in Dade County," the East-Coaster said, "that you can swing a pint cup around your head and catch a quart of them."

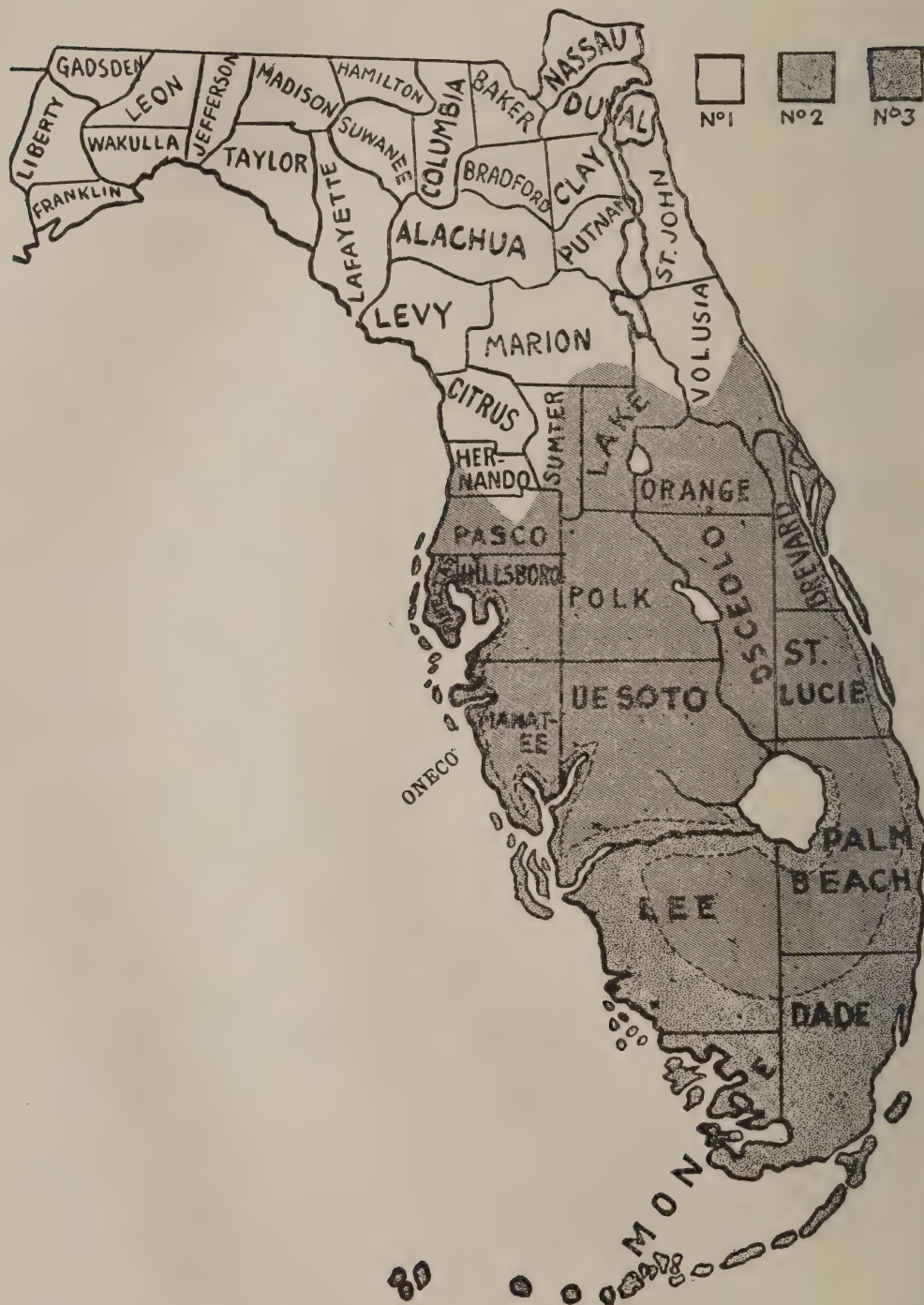
"That's nothing," replied the West-Coaster, "over where I come from they're so thick, and grow so big, you can't find room to swing the cup."

And just so it is with our climate. No section of the State wants to be out-done by any other in this respect.

"Why yes, just over the line in the other county they had a terrible freeze last winter; but it didn't hurt anything here. No, siree, this is the warmest spot in the State of Florida! Oh, yes, you'll see some dead ends on some of the trees where they were nipped a little but it didn't hurt them any. No, sir, *our* climate just can't be beat!"

Just such tales as this can be heard in any locality over the State; and the matter of accurate determination of damage resolves itself into a matter of one's own





personal knowledge. It was this reason alone, combined with a desire to observe the damage to supposedly hardy species that led my father to tour the whole southern end of the State immediately following the freeze of '17.

From our thirty-eight years of experience with Florida conditions we have evolved the philosophy that there is *no* section of the State, at least on the main land, that is *absolutely* free from occasional frost. Of course there are some sections more free than others; some where, even when it does turn cold, it is only of short duration and seems to lack that stinging power it possesses farther north. So after all we are only *relatively* tropical, not *absolutely*.

How important this consideration must be to the landscape architect, can be readily illustrated. Suppose in his effort to secure a definite effect he has recourse to very tropical plants to sound the key note of his garden—either as to color or foliage. Supposing, then, one of our occasional freezes is so inconsiderate as to interfere and kill these tropical plants down to the ground. After all, he's worse off than he was in the beginning; for he has lost not only his plants but a year or more of valuable time. In considering plant materials it is well to remember then the only *relative* immunity from frost of most sections of the State, and make the backbone of the development at least relatively hardy. Nature has aided considerably in this regard by providing a large class of shrubs which while they may be killed to the ground by a hard frost, will yet sprout again from the roots, and thus may for practical purposes be said to be hardy. Hi-

biscus, oleanders, acalyphas, lantana, poinsettias, stenolobium, and phyllanthus will be recognized among this class.

Having given the matter considerable study, and finding it an asset as a ready reference, we prepared a rough map of the State a number of years ago showing the relative temperatures to be expected in various sections of the State and their comparative immunity from frost. Having found it helpful ourselves we are glad to pass it on, and a copy is being submitted with this report but it does not merit further attention here.

Having then finished our general remarks on Florida Climatology, the next consideration would be the relatively well known and comparatively little known plant materials.

In order to consider the little known materials it was first necessary to separate the well known, and to this end I have prepared a table covering seventy-five of the better known subjects with notes as to their common names, native habitat, color of flowers, blooming period, height, hardiness, and soil preference, and other remarks. This is submitted with this report but needs now no further attention. Conifers have not been included in this list, except for Casuarina, not because we are unaware of their many fine qualities, but because of the feeling that in a comparative tropical State like this with our wealth of broad-leaved evergreens it would be better to use distinctive subjects which can not be grown in other states. We realize the value, of course, of the conifer in the proper position, especially trees. It is the use of conifers in foundation plantings to which we wish to particularly take exception.

FLORIDA CLIMATOLOGY IN RELATION TO  
PLANTING

Area 1. This includes all western and peninsular Florida as far south, roughly speaking, as Hernando, Marion and northern Volusia counties as shown in accompanying map. The few southern counties of this area—those just mentioned—practically mark the northern limit of the citrus industry. There are scattered groves north and west, of the hardier types on hardier stocks, but they do not figure conspicuously in the industry. This region is especially adapted to the deciduous fruits that are suited to Florida planting as the Persimmon, Fig, Pecan, Peach, Plum, Pear, etc. It is true that most of the varieties commonly grown in Florida do splendidly even in south Florida, but generally speaking they reach their perfection in the northern sections of the State. You will note on going over the remarks on hardiness at the head of each department, to which we call your especial attention, that the \* is used to indicate this relative hardiness.

Area 2.—This is really more than "central Florida," as it covers all of the southern half of the State with the exception of a narrow strip of better protected territory on both coasts from Pinellas County around to Brevard, which widens out at the southern extreme to include Dade and Monroe counties, and a large portion of Lee and Palm Beach counties, all of which constitute Area 3. We leave the larger portion of the Everglade country in the second area as comparatively little is known as to just what

its climatic conditions may be and at some points there it has been colder on occasion than at many points farther north. Area 2 includes the bulk of the citrus territory as now understood, and also the most celebrated trucking centers of the State. Because of its unusual location, most of the plants we list can be grown successfully with the exception of some of the more tender tropical sorts, though even of these many shrubs may be grown, for even if the tops are killed down, they come right up and flower and fruit again.

Area 3.—Includes the more strictly sub-tropical area in which all plants are as near hardy as at any point in the United States. At the points farthest north, along bays and rivers where water modifies the temperature in cold weather very perceptibly, this area of comparatively safe planting of tropical material extends back from the water one or two miles, the strip widening as it extends southward.

On the information contained in this table, and on considerably less in some instances, most of the landscape work of the State has been done. It was in the effort to broaden this information, that this article was conceived, and the following paragraphs given.

Taking up the subjects in the same order as given in the table, first of all come the Palms. As will be shown in a later paragraph, the palm is one of the primary motifs in the tropical landscape, and certainly the one on which our northern friends lay the most emphasis. It behooves us therefore to pay particular at-



tention to the palms and to use them as often and to the best advantage possible.

First of all there is the *Acrocomia totai*, one of the handsomest of all palms, attaining a height of thirty to forty feet, and crowned with a magnificent head of graceful pinnate leaves. Its only drawback—and it is seldom indeed that we meet perfection in plants as we do in persons—is the fact that it is protected throughout, both trunk and leaves, with exceedingly sharp, long thorns, making it unsuitable for parkways and similar public uses. For the private estate, especially for creating backgrounds, it is, however, without a peer. But best of all it is comparatively hardy, being about as resistant as the *Cocos plumosa* and doing well up into the center of the State.

Another interesting item is with regard to *Archontophoenix alexandrae*, which I am told does well here in Miami. From our experience in growing decorative palms, it would seem that for large tub specimens it is much superior to the commoner *seaforthia*, although it is a trifle less hardy. It is a wonderful palm in the open ground too and deserves more attention than has been given it.

*Arenga saccharifera*, the Java Sugar Palm; *Dictyosperma rubra*; *Elaeis guineensis*, the African Oil Palm; and *Hypophorbe verschaffeltii*, a stubby-leaved orange-colored palm from Mauritius, are all magnificent tall-growing palms which should be planted extensively in the lower end of the State.

To come back to hardier materials it would be well to call attention to the Giant Sabals, *blackburniana* and *havenensis*, hardy practically throughout the

whole State. Then, too, there is the *Phoenix sylvestris*, resembling the well known *Ph. Canariensis*, but lacking the extreme drooping habit of its leaves. It is of interest, too, for its picturesque trunk, slender with the boots remaining on the entire length. It is also interesting to note that it is a much faster grower on poor soils.

In the hardy dwarf palms it would be well to remember the Hardy Cocos of the *Australis* type, comprising several closely connected species, and the *Livistona Chinensis* or *australis*, formerly known as *Latania*. These are wonderfully decorative subjects and hardy throughout the State. The *Trachycarpus excelsa*, sometimes still called *Chamaerops*, has almost disappeared, and is now seldom encountered in nursery stock as it is such an extremely slow grower. An excellent substitute, and even preferred by some, is found in the native porcupine palmetto, *Raphidophyllum hystrix*, unfortunately quite rare too.

Passing from the Palms to the shade trees we are struck at once by the lack of variety in comparatively hardy evergreen subjects. In this southern section of the State you have a wealth of suitable materials, and it is peculiar indeed to note how badly this has been neglected in a section so richly endowed by nature and which has advanced so rapidly in other ways. Having as you do so many truly wonderful trees that can be grown nowhere else in the United States, it will be to your eternal discredit if you do not realize on some of these opportunities. And whatever you do, in all conscience give the Australian Pines a rest! Truly

it is a wonderful subject in its place, but the good Lord never meant it for every use under the canopy, which is about what you seem to expect of it. For seashore use where salt and poor soil must be combated it is without a peer—but that is about enough to expect of it!

What a pity three or four miles of the Dixie Highway from Palm Beach south could not have been planted with Bauhinias, world-famed for their orchid-like beauty, instead of the somber Australian Pines. Another section planted with Jacarandas; still another with the justly famous Silk-Cotton from Jamaica; another with the blood red Sterculia; or Stenocarpus sinuatus, the wheel of fire; or a number of other truly wonderful subjects. Had this been done you would have had a leafy tunnel, constantly changing, both from mile to mile and from day to day. Indeed it could have been so arranged that not a day would have passed without finding some section in full bloom, making it a true "Pathway of Flowers."

In the central and northern sections of the State much work must yet be done in searching for really distinctive subjects at the same time practically hardy. It is well to note the increasing use of the Silk Oak, *Grevillea robusta*, in the central portion of the State, especially the high, dry sand hills of Polk County, which is just the type of soil they appreciate. It is good to know, too, that these trees can now be obtained in large sizes, suitable for street planting, and doing away with a large portion of the delay in securing immediate effects. The Jacaranda is also coming into its own. About as hardy as the *Cocos plumosa*, it is being extensive-

ly used in the central section of the State, and it will not be long until its wonderful sky-blue mass of flowers will be a common sight throughout the State during April and early May. It prefers a rather damper soil than the *Grevillea* but it must be well drained. The *Melaleuca leucadendron* should be mentioned also. It is commonly called Cajuput or punk tree, but really it isn't a "punk" tree but a very fine one, especially on low, wet situations not too cold. It is also salt resistant. We are doing quite a bit of experimental work in the effort to extend this list of hardier shade trees and hope to be able to report additions, but we'll have to wait until we have a real freeze before we can report definitely.

In passing from the shade trees I should like to mention the *Callitris verrucosa*, or cypress pine of Australia, a truly wonderful conifer and hardy throughout the State, and growing well even in the poorest white sand ridges. Ordinarily it makes a broadly columnar tree up to sixty feet in height and branched all the way up from the ground. By a little trimming, however, it can be forced up as slender as an Italian cypress or it can be kept down into a low spreading, round headed tree, this adaptability making it very useful in landscape artistry.

Having spent so much time on the palms and shade trees, we will have time only for a hasty survey of the shrubs and vines before passing on to the consideration of the methods of obtaining tropical effects.

In the tropical shrubs we have again a wealth of materials, comparatively little known, and surely worthy of planting





TABLE OF COMMON PLANT MATERIALS

SCIENTIFIC NAMES	COMMON NAME	NATIVE HABITAT	COLOR OF FLOWERS	BLOOMING PERIOD	HARDINESS	SOILS	HEIGHT	REMARKS
PALMS								
Cocos Plumosa	Plumy Cocoanut	Brazil	Yellow, insignificant	Spring and Summer	Down to 26 degrees	Well drained	50 ft. or more	A very fine palm for street parking. Substitute for Royal Palm.
Cocos nucifera	Cocoanut	Tropics	Yellow, insignificant	Spring and Summer	Slight frost only	Light soils	40 to 70 ft.	Salt resistant. The common seashore palm of the tropics.
Oreodoxa regia	Royal Palm	Cuba	Yellow, insignificant	Spring and Summer	Slight frost only	Heavy, damp, muck	50 to 125 ft.	The finest of the palms.
Phoenix canariensis	Canary Island Date	Canary Islands	Yellow, insignificant	Spring and Summer	Down to 15 degrees	Medium	30 ft. or more	Has a leaf spread of 40 ft. or more, and hence demands space.
Phoenix reclinata	Natal Date Palm	So. Africa	Yellow, insignificant	Spring and Summer	Not much below frost	Good, well drained	Up to 30 ft.	Forms ornamental clumps by suckering from bottom.
Sabal Palmetto	Cabbage Palmetto	Florida	White, insignificant	Spring and Summer	Down to 15 degrees	Not too dry	25 to 40 ft.	Palmate. Good for street parkings.
Washingtonia robusta	Cal. Fan Palm	Col., Ariz. and Mexico	White, insignificant	Spring and Summer	Down to 15 degrees	Not too dry	Up to 40 ft.	Palmate. Good for street parkings. "Thread Palm."
TREES								
Cinnamonum camphora	Camphor Tree	China and Japan	Greenish yellow, insignificant	Spring	Hardy all over Florida	Well drained	30 to 50 ft.	Handsome, rounded tree, low branching.
Delonix regia	Royal Poinciana	Madagascar	Bright scarlet, showy	Late Spring ?	Slight frost only	Good soil	About 30 ft.	Usually low branched, and very spreading.
Eucalyptus robusta	Swamp Mahogany	Australia	White	May	Down to 26 degrees	High and dry	Up to 125 ft.	Tall and slender, very objectionable in neighborhood of sewer
Eucalyptus rostrata	Red Gum	Australia	White	May	Hardier than above	High and dry	Up to 125 ft.	lines. Subject to blight.
Grevillea robusta	Australian Silk Oak	Australia	Orange, brown and yellow	April	About like orange	High and dry	50 to 100 ft.	Very good for street planting, but drops some litter.
Magnolia grandiflora	Southern Magnolia	So. United States	Large, white and fragrant		Absolutely hardy	Heavy, damp	50 to 75 ft.	Very ornamental, but slow growing.
Quercus laurifolia	Laurel Oak	So. United States	Insignificant		Absolutely hardy	Practically any	50 to 75 ft.	Our commonest street tree. Miscalled "Water Oak."
Casuarina equisetifolia	Australian Pine	Australia			Slight frost only	Practically any	50 to 75 ft.	Salt resistant, graceful tree, but overworked in South Florida.
BAMBOOS AND GRASSES								
Bambusa argentea	Bamboo	Japan			Down to 26 degrees	Practically any, but must be well drained	35 or 40 ft.	The common small-caned clump bamboo.
Bambusa disticha	Dwarf Bamboo	Japan			Down to 26 degrees		10 to 12 ft.	Dwarfer form used for screening.
Bambusa vulgaris	Giant Golden Bamboo	Japan			Slight frost only		Up to 75 ft.	The common giant bamboo.
Cortaderia selloana	Pampas Grass	?	Silvery white	Summer	Hardy	Medium	4 to 6 ft.	Much used for its fountain-like effect.
TROPICAL SHRUBS								
Acalypha mosaica	Acalypha		Green, yellow and red foliage		Slight frost only	Good, well drained	4 to 6 ft.	Colors stronger in cold weather, stands trimming well.
Caesalpinia pulcherrima	Dwarf Poinciana		Red and yellow	Summer and Fall	Slight frost only	Good, well drained	6 to 10 ft.	Also known as "Barbadoes Flower Fence." Spiny.
Duranta repens	Golden Dewdrop	Am. Tropics	Lilac, golden fruit	Practically continuous	About 28 degrees	Good, well drained	6 to 10 ft.	Somewhat subject to root knot.
Euphorbia pulcherrima	Poinsettia		Fiery red bracts	Winter	Slight frost only	Must be rich	6 to 10 ft.	Sheds its leaves in cool weather and must have other lower foliage.
Hibiscus rosa-sinensis	Double Pink	China	American Beauty shade	Perpetual	About 28 degrees	Any good soil	4 to 8 ft.	The commonly used shrub for quick effects. Useful as hedge, mass planting, or single specimens. If frozen down, comes up again from roots. Must have good drainage.
Hibiscus rosa-sinensis	Peachblow	China	Double light pink	Perpetual	About 28 degrees	Any good soil	4 to 6 ft.	
Hibiscus rosa-sinensis	Double Red	China	Deep scarlet	Perpetual	About 28 degrees	Any good soil	3 to 5 ft.	
Hibiscus rosa-sinensis	Single Pink	China	Medium clear pink	Perpetual	About 28 degrees	Any good soil	6 to 8 ft.	
Hibiscus rosa-sinensis	Euterpe	China	Orange salmon	Perpetual	About 28 degrees	Any good soil	6 to 10 ft.	See other hibiscus.
Hibiscus rosa-sinensis	Single Scarlet	China	Rich glowing scarlet	Perpetual	About 28 degrees	Various	8 to 12 ft.	Strong odor to leaves. Coarse shrubbery.
Lantana	Shrubby Verbena	Tropical America	Variety, except blue	Perpetual	Some frost	Light, well drained	4 to 6 ft.	Useful for low hedge.
Phyllanthus niv. r. p.	Snow Bush		Pink and white var. foliage	Perpetual	Some frost	Good soil	4 to 6 ft.	Border and foundation planting.
Plumbago capensis	Blue Leadwort	So. Africa	Sky blue	Perpetual	Slight frost	Good soil	4 to 6 ft.	Require sun for coloration.
Phyllaurea	Croton		Red and yellow var. leaves		Slight frost	Good soil	3 to 8 ft.	Very dormant in winter.
Tabernaemontana coronaria	Cape jessamine	India	White	Except Winter	Slight frost	Good soil	5 to 8 ft.	Border and foundation planting.
Thunbergia erecta		W. Africa	Dark blue, orange throat	Practically perpetual	Slight frost	Almost any	4 to 6 ft.	Stands full sun exposure well. Profuse bloomer, good border.
Thunbergia erecta alba		W. Africa	White, yellow	Practically perpetual	Slight frost	Almost any	4 to 6 ft.	
Vinca	Periwinkle	?	White and magenta	Perpetual	Slight frost	Almost any	1 to 3 ft.	
HARDY SHRUBS								
Abelia grandiflora	"Abelia"	?	White with pink base	April to November	Hardy throughout	Heavier	4 to 6 ft.	Foliage metallic bronze color in winter.
Azalea indica	Indian Azalea	?	All shades except blue	Winter and Spring	Hardy throughout	Loose humus	3 to 6 ft.	Absolutely no lime,—acid soil.
Camellia japonica	"Japonica"	China and Japan	Pinks, reds and whites	Winter and Spring	Hardy throughout	Heavy loam	6 to 15 ft.	Wonderful, glossy foliage.
Eleagnus reflexa	Silverthorn	Japan	Yellowish, insignificant	Late Summer	Hardy throughout	Various	6 to 10 ft.	Gray green foliage.
Hydrangea hortensis	French Hydrangea	?	Many shades	Summer	Hardy throughout	Heavy, rich	2 to 5 ft.	Unfortunately partly deciduous in winter.
Lagerstroemia indica	Crepe Myrtle	China and Japan	Carmine, pink, purple and white	Summer	Hardy throughout	Various	6 to 20 ft.	Deciduous.
Laurocerasus caroliniana	Carolina Laurel Cherry	Carolinas	Creamy	Spring	Hardy throughout	Lighter soils	10 to 40 ft.	Wonderful glossy foliage.
Ligustrum amurense	Amoor River Privet	Japan	White	Spring	Hardy throughout	Various	6 to 15 ft.	Common hedge material
Ligustrum nepalense var.	Var. Nepal Privet	Nepal	White	Spring	Hardy throughout	Various	6 to 15 ft.	Fine hedge, also good for individual specimens.
Ligustrum lucidum	Wax Privet	?	White	Spring	Hardy throughout	Various	6 to 12 ft.	Fine hedge, also good for individual specimens.
Michelia fuscata	Banana Shrub	China	Cream colored, fragrant	Spring	Hardy throughout	Good soil	10 to 15 ft.	Can be kept lower by pruning. Slow grower.
Myrica cerifera	Wax Myrtle	So. United States	Foliage only		Hardy throughout	Almost anywhere	10 to 30 ft.	Salt resistant. Requires moisture.
Nerium oleander	Oleander	Asia Minor	Pinks, reds and whites	Spring and Summer	Stands some frost	Almost anywhere	6 to 15 ft.	Salt resistant.
Pittosporum tobira	Tobira Shrub	China and Japan	Creamy white	March	Hardy throughout	Good rich soil	6 to 10 ft.	Salt resistant. Good hedge, also specimen plants.
Rhapiolepis indica	Indian Hawthorn	India	Pinkish white	Spring	Hardy throughout	Good rich soil	4 to 6 ft.	Extraordinarily slow grower.
Viburnum tinus	Snowball	China	Creamy white, fragrant	Winter	Hardy throughout	Good rich soil	6 to 10 ft.	Very fine in North Florida, not so much in South. Well drained.
Viburnum odoratissimum	Snowball	China	Creamy white, fragrant	Late Spring	Hardy throughout	Good rich soil	6 to 20 ft.	Does well throughout the State.
Warneria augusta	Cape Jessamine or Gardenia	China	White, fragrant	Late Spring	Hardy throughout	Heavy loam	6 to 8 ft.	Very subject to white fly.
VINES								
Allamando Hendersonii	Allamanda	Guiana	Clear yellow	Throughout year	Some frost	No lime		Makes a fair shrub, too.,
Antigonon leptopus	Pink Vine	Mexico	Rose pink	Spring and Summer	Slight frost	Various, damp		"The Rosa de Montana."
Bougainvillea gl. sand.	Paper Flower	Brazil	Peculiar dull purple	Winter and Spring	Some frost	Well drained		Clashes with most colors.
Ficus pumila	Creeping Fig	Orient	Foliage only		Some frost	Various		Fine for brick work.
Gelsemium sempervirens	Yellow Jessamine	So. United States	Yellow, fragrant	Early Spring	Hardy	Various, damp		Choice, native.
Jasminum pubescens	Hairy Jessamine	?	White	Throughout year	Fairly hardy	Various		Also as a shrub. Profuse bloomer.
Lonicera sempervirens	Coral Honeysuckle	So. United States	Waxy scarlet	Summer	Hardy	Various, damp		Choice native.
Nintooa japonica	Yellow Honeysuckle	So. United States	White to creamy yellow	Spring and Summer	Hardy	Various, damp		Choice native.
Pyrostegia venusta	Flame Vine	Brazil	Orange red	Winter and Spring	Some frost	Various		Wonderful for roofs, pergolas and fences.
Tecoma radicans	Trumpet Creeper	So. United States	Orange red	Spring and Summer	Hardy	Various		Native, rather shy bloomer.
Trachelospermum jasmin	Star or Confed. Jessamine	China	White, fragrant	March and April	Hardy	Various		Fine glossy, thick foliage.
MISCELLANEOUS								
Nephrolepis cordata compacta	Sword Fern	?	Foliage only		Some frost	Heavy, rich, damp	1 to 2 ft.	The common border fern.
Cannas	Indian Shot	?	Reds, pinks and yellows	Spring and Summer	Slight frost	Heavy, rich, damp	3 to 6 ft.	Useful for ornamental beds; bronze and green foliage.
Hemerocallis	Day Lilies	So. United States	Yellow and orange	Summer	Hardy	Heavy, rich, damp	2 to 3 ft.	Very showy.
Hippeastrum	Amaryllis	Tropical America	Red	March and April	Hardy	Heavy	1 to 2 ft.	Very showy.
Eugenia	Surinam Cherry	?	White	Spring	Some frost	Good soil	6 to 12 ft.	Makes a wonderful dwarf hedge.



throughout the whole southern end of the State. To mention only a few in passing, we have, of course, the *Acalyphas* in variety; the fragrant *Artobotrys* and *Cestrum*, not to forget the wonderful rose-pink *Cestrum elegans* and the orange *Cestrum aurantiacum*, which are not fragrant; the *Assonias* with their large composite heads of soft pink flowers, a single head making a nice corsage; then the *Daedalacanthus*, with its intense blue flowers coming at the height of the tourist season; the *Ixoras* in both red and yellow; the charming Turk's cap, or *Malvaviscus*; the intense yellow *Stenolobium* or yellow elder, a true gamboge shade; and so on down the list. A truly wonderful variety, also sadly neglected for the better known *Allamandas*, *Hibiscus*, and *oleanders*.

In the hardy shrubbery, the havoc caused by the Federal Quarantine 37 will of course be noted, cutting off as it did the importation of azaleas and camellias from abroad and forcing the American nurseryman back on his resources. That he accepted this challenge, and won out with his usual ingenuity and enterprise, goes, of course, without saying, and it is interesting to note that there are two firms at least, possibly more, in Florida, that will shortly offer their own stock of these materials. *Pittosporum*, *Laurel Cherry*, *Oleanders*, *Privets*, etc., have of course been affected by this shortage in other lines but are now getting back to normal again. Just at present the only well known hardy materials which are hard to obtain are the sweet olive, *Osmanthus fragrans*, and the anise shrub, *Illicium anisatum*, and it is to be hoped

that some way of augmenting the visible supply of these two excellent subjects will be found.

As to notes on new subjects we would call attention to *Eugenia hookeriana*, *Ligustrum massalongeanum*, and *Viburnum suspensum* (also known as *sandankwa*), all truly magnificent subjects which we have obtained from California, and while they have not been tested as yet by a real freeze we believe they will be found hardy throughout most of the State. We have also discovered a *Raphiolepis japonica*, which is the equal or superior of the well known *indica*, and which grows five times as fast. There is considerable confusion, however, in the nomenclature, the ordinary *indica* being listed as *japonica* by some nurserymen, the obtaining of a stock of true *japonica* is, therefore, beset with difficulties. The *Ilex paraguayensis*, or the "yerba mate" of the Argentine, also shows promise and is being propagated for use as a hedge or the taller shrubbery. It will of course be entirely hardy. The native *Myrtle*, *Myrica cerifera*, and salt bush, *Bacharis halimifolia*, are being field grown too, as for some situations they simply "can't be beat."

In the vines it will be enough to pause a moment to bewail the comparative lack of interest in the wonderful newer species of *Bougainvilleas*. We do not, of course, under-rate the common *glabra sandriana*, as we are well acquainted with it from years of experience; but to mention it in the same breath with some of the newer species seems almost like sacrilege. By a great deal of work and experimentation we have worked up five of the new

species to a commercial scale, the colors ranging from a deep purple, through light purple, red, and pink, to the most intense and glowing crimson. There are two more forms on which we are working but have not as yet sufficiently tested out. It is interesting to note here the entirely different colors of the flowers in plants grown under glass—it would seem there is some slight variation also in individual specimens out-of doors. In general, however, the assortment of vines is more complete than any other class of materials. We must not forget, however, to mention the Brazilian Glory, with its scientific name of thirty-three letters, in spite of which it is a wonderful subject covered twice a year with a multitude of carmine-crimson flowers. Unfortunately it is comparatively tender, but if frozen down it will come up again from the roots.

Passing then from the notes on new plant materials, we come to the last and shortest division of my subject, the creation of tropical effects.

Tropical atmosphere is a difficult thing to define, for after all it is not based on things as they *are* in the tropics, but on what some people *think* about the tropics. In other words, a dense forest of trees with their branches so thickly interlaced as to make broad noonday only twilight beneath, would never be tropical atmosphere; even though it happened to be in the Amazon valley, broiling on the equator, and the trees were Bread-fruit or other tropical trees! What is called tropical atmosphere, at least to the northern mind, is best described in the works of

Jack London, Robert W. Chambers, or some other of our popular novelists.

"What then is tropical atmosphere," you will ask in despair? "You say it is not necessarily the natural growth of the tropics, and you illustrate it with pictures that never existed except in the mind of the author—in other words were only dreams!"

That's it exactly — "Only dreams!" Only such pictures as you dream of \* \* \* the myriad leaves of waving palms \* \* \* the great raw masses of color, not refined, not cultured, but primitive as man's inmost emotions \* \* \* the teasing scent of strange perfumes borne on the tranquil breezes of the night \* \* \* the glistening crescent beaches, bathed by a slowly surging sea, bluer than turquoise, more baffling than the sphinx \* \* \* quiet \* \* \* rest \* \* \* ineffable ease \* \* \* the far-off strains of distant music. \* \* \*" This indeed is the tropic atmosphere, not real, perhaps, but then who cares for reality? The fantastic tissue of dreams, in that lies our tropic charm!

If, then, we are to create the tropic atmosphere we must emphasize the infinite variety of our dream subjects; must fill in our background with waving palms; must paint largely and with strong colors; provide if possible, a water view or the sound of a gurgling stream; must provide new and strange perfumes; and above all we must provide ease and accessibility, so that our tropical grounds shall indeed be dream places, filled with fairies, and far-removed from the rush and harshness of a busy world.

"How to create this atmosphere?"



More than I have given, I cannot tell you! Can the artist give directions for painting again his masterpiece, or can the glowing cardinal tell why he loves his mate? No more can I tell you. It is only something which we love and to which some of us have dedicated our lives. If we have some

small measure of success, it is not to us to whom credit should be given, but to Him who created these materials, the living pigments with which we work, and gave us the power and imagination, and even opportunity, to work with them.

# Ornamentals Growing on the Lower East Coast of Florida

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J. B. Donnelly, Palm Beach

The subject of my paper is Ornamentals growing on the lower East Coast of Florida. As I live at Palm Beach a description of the plants growing here will probably do for the territory between Fort Pierce and Cape Sable.

To mention all the ornamentals growing in that stretch of coast would make my paper rather lengthy so I will confine myself to such plants, vines, and trees as are growing in my immediate vicinity, and which can be grown, and probably are growing in several places along the coast.

*Catesbia Spinosa*, a very handsome evergreen shrub, with small, dark green shiny leaves, flowers pale, yellow, drooping, lily shaped, branches full of small spines. The plant is very ornamental when in bloom and I think equally so, when covered with the seed berries which are pale yellow and resemble the fruit of the Kumquat. Grown from seed or cuttings. Common name, Thorn Lily.

*Thunbergia erecta* is a very satisfactory shrub, almost continuous bloomer, flowers tubular, dark blue with a rich orange and yellow throat, does best with me in partial shade; easily propagated from cuttings. There is a white flowering variety of this, *T. erecta alba*.

*Eranthemum pulchellum*, this is a soft wooded plant, particularly useful because it is a winter bloomer, from November to May. The flowers are a rich bright blue, very freely produced, easy of propagating from cuttings of young wood.

*Plumbago Capensis*, a splendid shrub, suitable for planting singly, making hedges, or for training on a trellis. The flowers which are borne in great profusion are of a pale blue color, propagated by off shoots from the base of the plant. There is a white flowering variety, but I find it a weak grower.

*Murraya exotica*, is a fine clean shrub suitable for hedges as it stands close shearing, it has small glossy green leaves and white, sweet scented flowers in clusters, followed by red berries which hang on for a long time. Planted out as a specimen it can be pruned into any desired shape. There is another variety, *M. paniculata* differing only in its fewer flowers and larger growth. These shrubs are now named Chalcas.

*Hibiscus*, of which we have about a dozen varieties are too well known to require any description. They are useful for planting as single specimens or for hedges, windbreaks, etc. They have to be cut back well every year to be kept in

bounds. They are easily propagated by cuttings and grow freely in almost any kind of soil or sand.

*Jacobinia coccinea*, a quick growing, soft wooded plant, easily propagated, fine foliage and tall terminal spikes of scarlet flowers. Good winter bloomer.

*Tabernamontana Coronaria fl. pl.* This is a very fine shrub with dark green leaves and large white sweet scented double flowers resembling *Gardenia florida*.

*Stenolobium Stans (Tecoma Stans)*. This well known shrub I find if cut back in the fall will bloom freely during the winter, large clusters of yellow, tubular flowers; blooms profusely in the fall.

*Bauhinias* in variety. These well known shrubs are of easy growth and should be planted more than they are. They will grow in the poorest soil and some of the varieties can be had in bloom at almost any time of the year. *B. purpurata* is a winter blooming variety and its large, orchid-like flowers are much admired by visitors. Propagated by seeds.

*Alpinia Nutans*—Shell Flower. This plant is related to the Ginger, a very handsome plant requiring rich soil and plenty of water and a sheltered situation to grow it well. The flowers are in terminal drooping spikes, pink, and sweet scented. The plant resembles the "Ginger lily." Common name, Shell Flower.

*Carissa arduina*. This plant is a small leaved evergreen with double spines; flowers white, star shaped, sweet scented; berries dark red when ripe; they make a fine jelly. The bush is almost constantly in bloom.

*Clerodendron pendulaflorum*, a very ornamental plant or shrub when in bloom, the flowers are in pendulous racemes from the ends of the branches. Many flowered shrubs about six feet high and bushy. There are several other varieties of *Clerodendron*, all desirable plants.

*Strelitzia*—*Augusta* and *Reginae*. This is a magnificent plant resembling in growth the Travelers Tree (*Ravanela*). The flowers of *S. Augusta* also resemble the flower of *Ravanela*. The flowers of *S. Reginae* are orange and purple. They are called "Bird of Paradise flower," are hard to describe but are well worth seeing. Both varieties bloom at Palm Beach. They require rich soil and plenty of water. The plant belongs to the same family as the Banana. Propagated by seeds and sprouts.

*Ravanela*, the Traveler's Tree. This fine plant resembles *Strelitzia Augusta*; its flowers are white, clustered in alternate boat shaped spathes. The plant grows fifteen or twenty feet high with a trunk resembling a palm. The seeds are covered with a blue woolly substance and are edible. A very striking and ornamental plant in all stages of its growth. There is considerable water stored in the large cup-like sheaths of the leaf stalks from which travelers are supposed to quench their thirst, hence the common name. Propagated by seeds and suckers growing from the base of the tree.

*Pandanus*, commonly called Screw Pine is a very ornamental plant. *P. utilis* grows to a height of twenty feet or more. The male and female flowers are on separate plants. The seeds grow in a large cluster resembling a pineapple of large



size and hangs on the tree for a year. *P. Veitchii* is an ornamental plant when young and is largely used as a pot plant. When planted out it makes a large specimen fifteen feet high with numerous aerial roots. When planted as a hedge or windbreak it is impenetrable in a few years. The leaves of all but one variety have spines along the edges and mid-rib. *P. Baptistii* is a smooth leaved variety with long finely variegated leaves.

*Monstera deliciosa*, an ornamental evergreen climbing plant, with curious perforated leaves attaches itself to a tree, house, or other support by its numerous aerial roots. The fruit resembles an ear of corn, with a delicious pineapple flavor and odor, propagated by cuttings of the stem. Another fine *Aeroid* is *Pothos Aurea* with large dark green leaves, striped and blotched with golden yellow, attaches itself to walls, trees, etc.

I don't know of any finer ornamental than a well grown specimen of the *Kumquat* (*Citrus Japonica*), with its bright green leaves and hundreds of golden fruit.

In colored foliage plants the *Croton*, I think, takes first place with its varied colors and forms. Some of the newer varieties are very fine planted out as single specimens, borders to walks, beds, or planted to cover unsightly places they are always attractive. They are also very effective when grown in pots or tubs, easily propagated from cuttings.

The variegated forms of *Aralia* and *Panax* are equally effective in groups, borders or pots.

*Aphelandras* and *Sanchezia* are also fine variegated plants.

*Acalyphas* in four or five varieties are largely used for borders, hedges or groups, etc.

Among the many vines growing here, *Thunbergia grandiflora* and *T. laurifolia* are I think the most satisfactory and beautiful. There is very little difference in these two varieties. They are continually in bloom. The flowers are light blue, about three inches across, and the whole vine is literally covered with them. It is a rampant grower and will cover a large space in one season. Propagated by cuttings.

*Petrea-Volubilis* is a very fine, hard wood twiner, with numerous spikes of blue flowers, blooms a couple of times during the year and is very attractive; a quick grower but rather difficult to propagate. The well known *Bougainvillea* is another fine hard wood climber. It is now covered with its purple bracts which makes it a very showy plant for covering arbors, porches, etc. The newer varieties are being planted largely. Their bracts are very attractive in color, brick red, crimson lake, etc.

*Bignonia Venusta*, "Flame Vine," is a very satisfactory vine of rapid growth, will cover houses and trees in a couple of years. It begins to bloom in December and continues for about three months. During that time it is covered with its large bunches of orange-red tubular flowers. There are several other varieties of *Bignonia* vines that are very showy and ornamental when in bloom.

*Ipomaea Horsfallae Briggsii* is a fine winter blooming vine of the *Convolvulus* family, with large racemes of crimson flowers and palmated leaves of shining

green. It has a large tuberous root and perennial—a very desirable vine.

*Solandra* is another desirable vine with large chalice like flowers of pale cream color changing to white. It is a strong grower, easily propagated. There are several other varieties.

There are many other desirable vines, winter and spring bloomers, such as *Solanums*, *Cryptostegia*, *Abrus*, *Rhynchospermum*, *Porania*, several varieties of *Aristolochia*, etc., that are easily grown and very beautiful when in flower.

Of palms we have the following varieties growing in the open ground without any protection and all doing well. *Cocos Nucifera*, the well known Coconut palm, bearing great quantities of nuts every year. *Cocos Plumosa*, and several others of this class. *Phoenix*, the Date palm; several varieties *Caryotas*; three varieties, *Areca*s; *Oreodoxia regia*, the Royal palm; *Washingtonia robusta*, the California palm; *Latania borbonica*, *Thrinax Argentia*, *Pritchardia pacifica*, *Attalea Cohune*, *Accrocomia totai*, *Hypophorbia Verschaffeltii*, *Seaforthia elegans*, *Martinezia Caryotaefolia*, *Sabal*, the palmetto, and several others.

We have two Cycads that do well here, *Cycas revoluta* and *C. circinalis*, that are very ornamental and make fine large specimens. Another Cycad, *Dioon edulis*, is a very fine plant, resembling *Cycas revoluta* but not having as many leaves.

In ornamental and shade trees there are a great variety, all making fine specimens in a very few years and nearly all of them suitable for planting in the territory mentioned. They seem to thrive in the poorest sand or rich jungle land

and on the rock ridges bordering Lake Worth.

*Tamarindus Indica*, Tamarind Tree, makes a wonderful growth, some specimens here being over thirty feet high, with a spread of fully thirty feet. A delicious drink is made from the pulp which surrounds the seeds.

*Albizia Lebbec*. "Whistling Bean," is another fine tree either for shade or street planting. When in bloom it fills the air with its delicate perfume.

*Bombax Cebia* is another fine tree, with buttressed roots and growing over forty feet high. It is commonly called "Silk Cotton Tree," and is very tropical in appearance.

*Grevillea robusta*, Australian Silk Oak, grows freely here and stands the salt air. Small plants set out fifteen years ago are now fully fifty feet high, with a trunk diameter of eighteen inches, two feet from the ground. In the spring the branches are covered with orange yellow flowers in large bunches. A fine tree for street planting.

Many varieties of *Eucalyptus* grow well here. Some fine specimens planted about fifteen years ago can be seen on several of the streets of West Palm Beach.

*Poinciana regia*, is so well known on the lower East Coast that it needs no description. When well grown it makes a tree forty feet high and wide spreading, covering over fifty feet with a dense shade. When in bloom it is a magnificent sight, covered with large bunches of scarlet flowers. Have known tourists remaining here to see the tree in bloom and take photographs of it.

There are about a dozen varieties of *Ficus*, Rubber Tree, growing here, nearly all, fine shade trees and suitable for street and road side planting. *Ficus altissima* makes a magnificent tree in a few years and is, I think, the finest of the species. *Ficus eburnea* is also a fine variety and a quick grower. *Ficus pandurata*, "The Majestic Rubber" has very large leaves, but is of slower growth. As a single specimen on a lawn it is very effective. *Ficus Nitida* is the best variety for street or roadside planting; it is a quick grower, gives a dense shade, has dark green, small leaves and is in every way a fine tree for the purpose named; it would also make a splendid wind break. A cutting of this variety about the size of a lead pencil was sent to me by mail some fifteen years ago and is now a tree thirty feet high, of compact growth, with a spread of the same dimension.

*Achras sapota*, the Sapodilla, is also a clean evergreen tree of slower growth than the *Ficus* but makes a very handsome shade tree.

*Jacaranda Mimosafolia* is a lovely shade tree; the leaves are finely pinnated like the Poinciana. The numerous flowers come in long erect panicles of a lovely shade of blue. It should be largely planted in South Florida. It is the most ornamental tree I know of and admired by everyone who sees it in bloom.

*Casaurina equisetifolia*, Australian Pine, so called, but it is not a pine. This tree is largely grown as a shade tree or windbreak along the lower East Coast; it seems to thrive under any conditions and stands the salt air well. It is largely used in making hedges. It grows very

fast. I have known them to grow ten feet high from the seed in one year. The wood is hard and takes a fine polish. It makes splendid fire wood and should be largely grown in waste places for this purpose alone. I find that this wood lasts longer than pine, it is not what would be called an ornamental tree, but for the uses mentioned it is the best. If cut back it branches better and makes a fine street tree.

*Parmentiera ceriefera*, the Candle Tree. This is a curious tree bearing large white flowers and long waxy yellow fruit resembling candles. The fruit is said to be edible, but I have not tried it although I had a crop of "Candles" last year.

*Kigelia pinnata* is another curious tree. It bears large trusses of tulip-shaped flowers followed by a crop of sausage-shaped fruit. It is commonly called "Sausage tree."

*Spathodea palmata*, *Parkia africana*, *Heritiera littoralis*, are all fine, tall growing trees raised from seeds sent me from the Philippines.

*Aberia Kaffra*, a dense growing thorny tree bearing golden yellow fruits resembling a miniature apple.

There are many other available plants, vines and trees suitable for planting along the lower East Coast, but I am afraid my paper is already too long to enumerate any others. I see no reason why there are not more ornamentals planted. They grow with very little care and are easily procured from nursery men at reasonable prices, and one can always get cuttings from a friend or neighbor who have plants growing. The poor man can grow a tree, shrub or vine as



well as the rich man if he is only inclined. Besides planting his grounds with desirable trees, etc., it makes his place more attractive and valuable. In conclusion I may add that all of the trees, shrubs and vines mentioned in this paper, and many others, have been planted by me and are growing on the property at Palm Beach which I have had charge of for the past eighteen years.

I would like to call the attention of real estate owners, promoters of subdivisions, Rotarians, Good Roads Associations, and Women's Clubs to the dreary stretches of roads along the East Coast

and other parts of the State. What a vast change could be made in their present appearance if there were trees and shrubs planted along the road sides, and there are trees and shrubs to be found suitable for the different soils. What a pleasing change it would be to the homeseeker or tourist in a few years, compared to the present uninviting conditions.

I would like to see some concerted action taken by these organizations to have these dreary road sides improved by planting suitable trees and shrubs and caring for them until they were established.

# Recent Development in Sub-Tropical Horticulture

W. J. Krome, Homestead

The Committee on Avocados and Sub-tropical Fruits, in arranging its portion of the program for this session, has endeavored to present to you information showing the development which has been made in the culture of sub-tropical fruits in various sections of our State in a commercial way, as well as the most recent technical data relative to the propagation of such fruits and the control of the diseases and pests which may infest them.

Our program deals largely with the Avocado because its culture in Florida has become more general than that of any other sub-tropical fruit and information of both a commercial and technical nature regarding it is more sought after.

During the past year there have been developments which are of great interest to the Avocado grower. A number of new and very promising varieties have been fruited and some of the older varieties have shown faults which were not fully anticipated. Seedling Avocados, grown from the seed of fruit of the Guatemalan type produced in Florida, have begun to bear, and the fruit produced by these trees has given an entirely new trend to varietal propagation.

Henceforth three distinct races of Avocados have been recognized. The Mex-

ican, which is hardy and produces fruit of fine flavor but so small in size and of such poor shipping qualities as to be hardly worth consideration as a commercial proposition; the Guatemalan, a race which provides varieties fairly cold resistant, prolific and bearing fruit of fine eating and shipping qualities but in many cases of too small size to meet the requirements of our Eastern markets; and the West Indian race, upon which the commercial culture of the Avocado in Florida has been founded and which still furnishes practically all of the fruit which is shipped out of this State. Occasional natural hybrid varieties have been brought to the attention of propagators, but heretofore these have been crosses between the Mexican and Guatemalan types. In their natural environment there has not been much opportunity for crosses of the Guatemalan and West Indian Avocados to occur, as the two races are seldom found in the same locality. But in Florida we now have West Indian and Guatemalan Avocados growing in close proximity, often blooming during the same period and, from the natural crosses which seem sure to result, we are quite likely to obtain, by selection, varieties combining the good qualities of both par-

ents and better adapted to Florida conditions than either. Several Guatemalan seedlings of Florida origin have borne fruit during the past season and in each case this fruit has been neither straight Guatemalan nor West Indian but has shown unmistakable evidence of being a cross of the two types, having some qualities superior to that of either parent.

This winter and spring, for the first time, Guatemalan Avocados have been placed on the northern markets in quantities sufficient to permit some idea being formed as to the reception which the consumer is going to give this fruit. At any rate enough have been shipped to make it evident that all markets do not value the Avocado alike. When Avocados sell in one city for \$42.00 per crate and in another only a few hundred miles away at \$10.00 per crate, for practically the same grade of fruit, as has been the case this season, it is apparent that neither market is giving the product its proper rating. However, while prices varied greatly, the fact that all offerings met with a ready sale, has been very encouraging to the producers.

Ranking next to the Avocado in importance, at the present time, we may safely place the Mango. That this delicious fruit has not been more heavily planted and has not reached a position commercially more prominent, has been due almost wholly to the indifferent bearing qualities of the finer varieties. Such fruit as is produced by trees of the Mulgoba, Haden, Amini, Paheri and several other of the East Indian type of Mangos, would have brought about the planting of thousands of acres and would have firm-

ly established the fruit as one of the most sought-after of all of our Florida products, were it not for the unreliable fruiting character of these trees, which so far has kept commercial Mango culture on about the same basis as lottery playing. The Bureau of Plant Industry of the United States Department of Agriculture has been working on this problem for a number of years and some of the results most recently obtained have been very encouraging. One of the papers to be presented at this session will give some interesting information along this line.

It has been heretofore accepted as a fact that Date culture on a commercial basis was limited in the United States to a few comparatively small, arid sections of California, Arizona and possibly Texas. That Dates could be successfully grown in Florida was not considered a possibility on account of climatic conditions, yet there now seems to be a fair chance that these conclusions have been in error and that this very profitable industry may be established on a commercial footing in at least one section of our State.

Dates have been produced on Key West Island and some of the adjacent keys for many years, but during the past decade the number of bearing palms has greatly increased and at the proper season ripe Dates are to be found on most of the fruit stands in the Island City. These facts have been brought to the attention of the officials of the Bureau of Plant Industry and some preliminary investigations have been made which, while not at all conclusive, are very interesting and encouraging.



The greatest obstacle in the way of Date culture in Florida has been the heavy rainfall and frequent dews during the maturing season of the fruit. The annual rainfall at Key West is hardly more than half of that at points on the southern mainland and there is said to be an almost total absence of dew throughout the period when the date is ripening. This opens possibilities for the fruit which may lead to the founding of an important industry.

A great many thousands of dollars have been spent in exploring the Date-growing countries of the Orient and in importing into the United States the offshoots of the finest varieties which are grown in those regions. These varieties are now grown commercially in the Coachella Valley and a few other sections of the West and the extension of the plantings is said to be limited almost wholly by the supply of offshoots available. These offshoots which provide the only certain means of growing the palms true to name, sell readily at from \$10.00 to \$20.00 each. During the past season the California Date growers have been able to market their first-grade fruit, after proper preparation, at from \$1.00 to \$1.50 per pound. When one considers that a full bearing Date Palm will carry an average of 100 pounds of fruit and that the processes of preparing this fruit for market are not more expensive than those required for most other similar products, some of the possibilities of this industry become apparent. Among the keys adjacent to Key West, there are thousands of acres of land which is too low in elevation above tide water to per-

mit the growing of any other fruit trees but upon which the Date Palm will thrive, for the Date does not object to somewhat salty soil conditions. The growers of Dates in California, to realize the best prices for their product must get it to our Eastern markets in advance of the best Dates from the Orient and this fact is apparently going to bar the commercial growing of some of the best varieties in that State. One fact brought out by the recent investigations by the Bureau of Plant Industry has been that the time of blooming of the Date Palms on Key West Island is nearly two months earlier than in California, with probably about the same difference applying to the season of maturity. The advantage of this would be very great to the Florida Date grower.

Unfortunately when the Date offshoots were brought into this country from Asia and Africa a serious scale was introduced, which has never been eradicated. If the industry is ever to amount to anything in Florida it would be a great mistake to burden it with this pest to begin with and it is therefore not advisable to bring into the State, even for experimental purposes, offshoots of the fine varieties which might otherwise be obtained from California. This will make any possible development in this State, slower of realization than would otherwise be the case, but the initial steps have already been taken and future results will be awaited with great interest.

Here, there and anywhere within our boundaries may be found men and women working with such fruits as the Litchee, the Papaya, the Anonas, the Guavas, the Carissa, the Jujube and a host of other

more or less exotic food plants. Little by little we are learning of what can or cannot be grown in sub-tropical Florida, and each one of these enthusiastic individual experimenters is doing a work of value for our State which should receive the utmost encouragement from the members of this Society.

Those of us who have lived here long enough have learned to use that phrase "waste land" very carefully when we apply it to areas within our own State, for we have seen many sections, which could be briefly described in that way with ap-

parent safety, become bountifully productive through the introduction of some new product or the application of new methods to the production of some old staple. It must be either a very learned or a very ignorant man who will make the unqualified assertion that any section of our State is hopelessly "waste land," for at any time some hopeless crank is likely to make his dream come true and bring into profitable production some plant which will turn that particular piece of wilderness into a garden.

# The Avocado From the Investor's Standpoint

L. F. Flipse

The Avocado, peer of salad fruits, during its short history in this country has stirred the enthusiasm of its grower, has been favorably received in all the largest markets of this country, and has gained for itself an enviable position from the investor's standpoint.

This fruit was first discovered by the earliest Spanish explorers in Central and South America, and it has since been distributed around the tropical world. Never before its introduction to Southern California and Florida has it been grown under modern grove methods, and never before has it been marketed on a scale to have reached the proportions of an industry.

It is not unusual in the development of new sections of our country to find new and favorable locations for the growing of fruits well known and established in our markets, but it is very rare, indeed, to find a new fruit with all the qualities to create an unlimited demand that has never before been exploited on a commercial scale.

The topic assigned to me, "The Avocado from the Investor's Standpoint," in its discussion calls for a record of the past performance of the Avocado in South Florida, and of its fruits in the markets of our country. Will it pay the prospective grower to grow Avocados as

we grow other fruits in this State? Will he be rewarded financially for capital invested and labor expended in growing this fruit?

Fortunately, the Avocado has made some very conclusive performance records right here in South Florida upon which to base expectations as to the future success of Avocado growing. We have passed the experimental stage and have established some very vital and fundamental facts upon which to base our predictions as to the financial success a grower of Avocados may expect. Fortunately also, the fruits shipped to our markets have not only made records but have broken all records for returns on fruit shipments.

In all horticultural pursuits there are two main factors essential to the success of the undertaking, viz.: Production of the fruit under practical conditions; and market distribution of the product at a profit.

It would be ruinous to attempt to grow any fruit on a commercial scale in a locality where soil and climate or any other condition prevented the fullest development or interfered with the natural functioning of the tree; nor would it be practical to grow any fruit commercially where cost of land or cost of bringing the grove into bearing and maintaining it in



a healthy and prolific state were so great that even the best of returns could not show a profit on the investment.

The best and most conclusive evidence that we can produce the fruit under practical conditions in favored sections of South Florida; that our soil and climate and seasons of drought and rainfall are all congenial to the fullest development of the tree and its fruit, lies in the trees now growing in this section and the fruits they have produced in past seasons.

We have in Southern Dade County seedling trees twenty to twenty-five years old and budded trees nearly as old. Trees that have weathered our storms, overcame frost injuries, or suffered none; rested in our periods of drought, and rejoiced in our tropic rains and sunshine. For twenty-five years some of them have accepted our climate and weather in all its moods and just as nature makes it and they stand today beautiful and thrifty specimens with all the vigor of youth.

I doubt whether the Avocado trees of the same age growing in their native lands in South and Central America would much surpass our trees in size and vigor or in productivity. Some of these old trees have a spread of fifty feet or more and tower no less in height. Some of them are so large in girth that my two arms would barely encircle their trunks. Many of them in one grove about fifteen miles south of Miami, were broken almost to the ground during the severe storm of 1910, but undaunted and with renewed vigor have put on new tops and quickly regained their place with their more fortunate neighbors. These old seedlings have not only made a favor-

able showing in size and vigor, but have also been generous in the production of crops. It is not uncommon for some of these trees to yield fifty or sixty dozen fruits. From a group of almost a dozen trees, 4,200 fruits have been sold and perhaps many more were produced by the same trees in other seasons.

These facts as to trees now growing are brought to the investor's attention to show that the Avocado is at home in parts of South Florida; that our soil and our climate are congenial to the productivity and longevity of the Avocado; that we have passed the experimental stage of Avocado growing here; and that we have here the first factor essential to the success of Avocado growing—the right conditions for the practical production of the fruit.

The growth and vigor of the trees show that our soil and climate, our seasons of rain and drought are congenial to the fullest development of the tree and its fruit. Our past experience in growing Avocados demonstrates most convincingly that these sections of South Florida are natural Avocado sections; that we have a natural Avocado belt here just as truly as they have a peach belt about Fort Valley, Georgia; just as certain as there is a natural cherry section about Sturgeon Bay, Wisconsin. And just as has the Hood River Valley become famous for its apples, so will South Florida become famous for its Avocados.

The second factor essential to the success of Avocado growing is the profitable distribution or sale of the fruit. The returns on Avocados sold in all past seasons have been most gratifying. Prices re-

ceived by the grower from the time first shipments were made to this date are evidence of its popularity, and the demand for this fruit has made it the highest priced fruit on the American market today. Our budded varieties of Avocados have made records of sales, in individual cases, which, used as a basis for computing grove returns would run into figures to stagger the imagination.

The fruit from a grove in Southern Dade County consisting of 200 budded trees returned over \$800.00 to the grower three and one-half years after trees were planted. The next season the fruit was sold for \$1,200.00 on the trees. Then followed two lean years on account of frost injury to the tips and bloom buds. Last season the fruit from this same grove netted the grower over \$4,000.00.

It is not uncommon to sell budded varieties of Avocados at from \$10.00 to \$20.00 per crate of about three dozen fruits, and the usual range of prices of the later budded varieties, on the tree, is from \$2.00 to \$3.00 per dozen. The question that arises in the mind of the investor is, "Will the markets continue to pay the prices paid in past years?"

The prices of Avocados or of any other fruit are governed by the law of supply and demand, and the answer to the question of future prices resolves itself necessarily into a prediction. If demand keeps pace with supply or vice versa, if supply falls short of demand, if the present ratio of supply to demand is maintained, then we may expect no reduction in prices of Avocados.

We have in this country a very limited area in which this fruit may be grown

under practical conditions. We have, so to speak, a monopoly on the growing of this fruit commercially south of the line passing somewhere through the peninsula of Florida, a limited area at best, and an important factor in limiting the supply and maintaining the past ratio of supply to demand.

True! The fruit may be grown commercially in the nearby tropical islands, but it is also true that the fruits of these islands will not carry satisfactorily beyond our seaport cities, and even there does not generally arrive in satisfactory condition. Furthermore, this fruit is from seedling trees and does not come into season with our best varieties. The grower of Avocados here does not recognize competition of foreign Avocados.

But a few years ago the Avocado was practically unknown in the markets of our large cities. Its sterling qualities won for it immediate recognition of the public, and by a flavor all its own and its characteristic as a salad fruit, it has held its popularity. To some the first taste may be insipid, but a taste usually invites another, which grows into a desire for more. The Avocado with a favorite dressing is pronounced the most delicious of all salads. Once the taste for the fruit is acquired, the desire to satisfy the palate becomes almost a craving, accompanied by a readiness to pay almost any price for the fruit.

In the tropics where the Avocado is well known it is eaten and relished by all; there is no substitute for the Avocado. It is and will be in competition only with itself. It is unique in character and fla-

vor, a salad fruit, and as such is not effected by other or competing fruits.

Its popularity is assured whenever and wherever it makes its appearance, and regardless of other fruits competing for popularity.

A desire for an orange or an apple may be satisfied by a grapefruit or a peach; but a desire for an Avocado will be satisfied only by an Avocado or an Avocado salad. Is it not safe to assume that the palates of the masses of Americans will respond likewise as we grow more of the fruit and make it possible for more to enjoy it?

The sterling qualities of the Avocado have hardly been touched upon. Its food

value is comparable pound for pound with that of milk and eggs and meat.

It is unfortunate, indeed, that this wonderful fruit cannot be produced from coast to coast in quantities to supply the demand for food for the masses; for young and old; to nourish the feeble, and give energy to the worker.

The future of the Avocado and the probabilities as to financial success of its growers are so promising as to halt expression of candid opinion and it seems evident from analysis of conditions that from the investor's standpoint the Avocado offers possibilities never before equalled by any horticultural venture.



# The Control of Insect Pests on the Avocado

G. F. Moznette, Bureau of Entomology, U. S. Department of Agriculture,  
Miami, Florida

The Avocado is not attacked by as many enemies as cause damage to citrus fruits which have been longer established within our borders, nevertheless there are a number of destructive enemies which cause concern to the Avocado grower, and which must be reckoned with in order to successfully produce healthy trees so that they may produce a satisfactory crop of fruit. It is generally admitted that practically every fruit which is propagated commercially has one or more enemies bent on its destruction. At times growers fail to think about these enemies until their trees and fruit are attacked by them, and then it is generally too late to repair the damage done. It is very important for the grower who wishes to produce healthy trees in order that they may bear a satisfactory crop of fruit, to be ever on the lookout to detect insect infestation; to know something about the various destructive pests which may attack his trees and the measures which he may employ in order to effectively control them.

The purpose of this paper is to bring together briefly some information concerning some of the more destructive Avocado insects present in Florida, so that the grower may have some knowledge concerning them, and become better

acquainted with some of the insect troubles he may at times be confronted with.

For the most part the insect pests causing damage to the Avocado in Florida resemble greatly in habit and general appearance those which attack citrus fruits. Practically all of them are insects provided with mouth parts fitted for sucking the juices from the plant tissues. Such pests as scale insects, white flies and mealy bugs found on citrus trees are also to be found on the Avocado. It is quite possible that some of the insect pests at present found attacking the Avocado in Florida have been brought in. Others may be insects which have always existed here on some native vegetation and have adapted themselves to the Avocado. Hence as groves are being established in different widely separated sections, we may possibly find at times different insect pests appearing which gradually establish themselves on the Avocado. This condition is quite true of most newly introduced trees and plants. Then again, we may find sections in the State where the weather conditions prove more favorable for the multiplication of certain pests which do not thrive where the weather conditions are more adverse. This condition is evidenced by certain pests which thrive in groves situated on

the keys with the close proximity of water which greatly regulates the temperatures. Many insect pests are sensitive to abrupt changes in temperature. Hence we may expect to find insect infestations severe in certain localities where others prove less favorable to insect activity.

During the dry winter months in Florida, the Avocado is generally considered in a dormant condition. At this time of year various enemies are to be found attacking the Avocado which thrive under conditions of little rainfall and low humidity.

#### THE AVOCADO RED SPIDER.

One of the enemies which attacks the Avocado during the winter is the Avocado Red Spider, *Tetranychus yotheresi* McG. In appearance it is not unlike most other red spiders which attack citrus trees. By examining the foliage carefully the red spiders will appear as mere red specks moving in every direction over the foliage when disturbed. It is very desirable for the grower to be provided with a suitable hand lens in order to be better able to detect and distinguish between the various pests he may come in contact with as many of the enemies are rather minute.

Trees heavily infested with red spiders appear in a comparatively short length of time under favorable conditions as if scorched by fire, the leaves turning brown and ultimately dropping. The over winter foliage should remain on the trees until there is sufficient new growth produced in the spring to take its place when normal shedding of the foliage will occur. Where the winter foliage is lost prema-

turely the result may be an abnormal development of the bloom, and a set back to the trees in their activity to sustain the proper set of fruit. The grower should watch his trees carefully and examine them frequently especially on the approach of dry weather in the fall, and when the red spiders are detected in numbers while the foliage is still green he should prepare to spray and not wait until the foliage has become browned and scorched.

#### Control.

The Avocado red spider may be controlled by spraying with the regular lime sulphur solution at the rate of one gallon to seventy-five gallons of water.

#### THE AVOCADO LEAF THIRPS.

Another enemy which may at times be seen infesting Avocado foliage is the so-called greenhouse thrips of the northern states, *Heliothrips hemorrhoidalis* Bouche, which attacks the Avocado in the open in Florida. This thrips resembles most other thrips in appearance, is black in color and about a millimeter in length.

The first indication of injury caused by this thrips is the production of pale colored areas to the foliage due to the extraction of the plant juices. These pale areas gradually run together as the work of the thrips becomes more in evidence over the leaf surface. Later the foliage assumes a brown color and appears scorched. Eventually the foliage drops prematurely as in the case of the red spider.

*Control.*

It may be controlled by using a spray of nicotine sulphate 40% at the rate of one gallon to nine hundred gallons of water. To this should be added four or five pounds of fish oil soap to each one hundred fifty gallons of the diluted spray mixture. The soap will cause the spray to spread more evenly over the foliage. If both the red spiders and thrips are present on the foliage, the two sprays of lime sulphur and nicotine sulphate may be combined, eliminating the soap. As both the red spiders and thrips carry on their depredations on the upper surface of the foliage, the spray should be primarily directed to that part of the foliage.

## THE AVOCADO BLOSSOM THRIPS.

With the approach of spring various other insect activities present themselves. Before the bearing Avocado tree produces new growth, the blossom clusters arise from the terminal twigs or from the base of the year's growth. The bloom as it appears is attacked by a blossom thrips, *Frankliniella cephalicus* Craw. This blossom thrips is not the same which attacks citrus in Florida, however, it does not differ materially in general appearance. It averages less than a millimeter in length and in general color is a pale yellow. It was first recorded as taken from the native acacia-like plants in the mountains of Mexico and it is quite probable that it has found its way into Florida from that country.

The injury by the thrips to the bloom is caused by the feeding of the young and adults on the individual flower parts destroying many of them in the course of their depredations. As succeeding generations appear the adults deposit their eggs in great numbers in the stems and pedicles which bear the floral panicles and which hold the fruits as they set to the terminal twigs. These punctures which later become emergence holes for the young reduce somewhat the strength of the stems which bear the fruit. This condition is evident in such varieties as the Trapp, which naturally bear weak stems. The thrips do not attack the fruit.

*Control.*

It may be controlled by spraying with nicotine sulphate 40% at the rate of one gallon to nine hundred gallons of water with the addition of four or five pounds of fish oil soap to the diluted spray, which serves as a spreader.

## THE AVOCADO WHITE FLY.

With the maturing of the bloom and the setting of the fruit new growth commences to arise from the floral racemes. As the new growth appears it is attacked by the Avocado white fly, *Trialeurodes floridensis* Q. This white fly is not unlike the species of white flies which attack citrus; it bears white wings and possesses a yellow body. It is however, somewhat smaller than most citrus white flies, and may be distinguished on the foliage in the pupal stage by the characteristic fringe which this stage possesses.



This white fly is usually more abundant in groves situated on the keys and stretches of land between the ocean and bay inlets along the lower east coast of Florida. This probably is due to the fact that the temperature registers more evenly in these localities. It is found, however, in varying numbers on the mainland and especially in nurseries on young trees in lath houses, where its activities are more or less protected and not greatly interrupted by the weather conditions.

The adults which appear in the spring of year emerge from the over wintering pupal stage clustered in great numbers on the lower surface of the older foliage. The adults deposit their eggs in great numbers on the new growth, the larvae which hatch from the eggs pass their existence on the lower surface of the leaves.

This species also produces an abundance of honey dew which accumulates upon the upper surface of the foliage and fruit. The common sooty mold fungus later develops in this honey dew deposit eventually giving the Avocado foliage and fruit a decided blackened appearance.

#### *Control.*

Where this pest is present in a bearing grove it may be controlled by spraying with the regular oil emulsion spray. Two sprayings will generally control the white fly, one during the spring after the fruit has set and the first general flush of new growth is sufficiently hardened, using a strength of one gallon to eighty of water. Another application should be made in the fall when the adult flies are for the most part off the wing and the foliage

is turning dormant using a strength of one gallon to seventy of water.

#### THE DICTYOSPERMUM SCALE.

At times various scale insects give the Avocado grower considerable trouble. One in particular is the Dictyospermum Scale, *Chrysomphalus dictyospermi* Morgan. In appearance it does not differ materially from a great many scales and resembles quite closely our common Florida red scale in shape and is a light amber in color.

Where this scale is present in a grove or nursery it attacks the twigs and branches, and where very numerous may often be found on the foliage. The branches attacked are gradually weakened and ultimately become of little use to the tree. The twigs and branches soon become roughened and crack considerably, thereby affording entrance places for various injurious plant diseases. As time goes on an infested tree shows a decided lack of lateral twigs and branches resulting in a badly formed tree.

#### *Control.*

The best time to control this pest on the Avocado is when the trees are dormant, usually from the middle of December until the first of February. The scale is readily killed by using an oil emulsion spray at a strength of one gallon to seventy gallons of water. Two applications of an oil emulsion spray at a three or four-week interval will control this pest.

## PYRIFORM SCALE.

A scale which seriously attacks the Avocado in a number of localities is the Pyriform Scale, *Protopulvinaria pyriformis* Ckll. In appearance this scale is somewhat convex, pyriform in shape and of a reddish brown color. In the adult stage it possesses a cottony matter which projects about the margins of the scale.

The scale attacks the foliage. The immature scales migrate in the spring to the new growth as they hatch from the mature scales on the older growth of foliage. In the process of development on the foliage honey dew is produced in practically the same manner as when white flies are present and eventually sooty mold covers the foliage and fruit.

*Control.*

It is controlled by using an oil emulsion spray as recommended for the Dictyospermum scale. However, in this case the spray should be directed toward the lower surface of the foliage where the scales are found.

This in a general way gives briefly some information concerning some of the more important Avocado pests. There are, however, still others of importance about which little is as yet known, while there are still others of less importance. As our investigations along this line continue, information concerning these will be available.

Lastly, I wish to mention, that it behooves us in this early stage of the Avocado industry, to take full account of all Avocado pests and strive in every way to do our part toward controlling and eradicating such pests as we now have and to prevent the importation of those that exist in other places. Stop and consider what saving would have been accomplished in our various fruit industries, if the various destructive pests had not been introduced or had been eradicated when first introduced. In Hawaii the Avocados are badly infested with a fruit fly, and the commercial growing of Avocados, which otherwise would have become important, has been ruined. Such pests as the Mediterranean fruit fly, the West Indian fruit fly and others, as well as a number of very dangerous Avocado weevils, occur in a number of places where Avocados grow and we do not want in Florida. Every traveler coming from some foreign land is tempted at times to bring along some of the rare tropical fruits attacked by these various dangerous pests. Our laws are stringent on this point, but people are ignorant and we are constantly threatened with the possibility of the importation of dangerous pests. We should all be alert and watchful to aid so far as we can in preventing any such pests that threaten our various fruit industries from becoming established.

# Spraying for Avocado Diseases

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H. E. Stevens, Ft. Myers, Florida

Last year, in a paper read before this Society, I mentioned some spraying experiments for the control of Avocado diseases which the Experiment Station then had in progress. At that time it was too early to anticipate what the results would be. Today I wish to again refer to those experiments and give you the results that were obtained since this work was done in the Redland section of Dade County. I believe this information will be of interest to the Avocado growers of this section of the State or other sections where diseases of the Avocado fruit are troublesome.

If you will pardon a little digression, I would like to touch on the future possibilities of the Avocado in Florida, for a few moments. I believe that a substantial and profitable industry can be developed in this line, not only with the Avocado but with the Mango and other sub-tropical fruits that seem to be well adapted to culture in South Florida. This view is becoming more prevalent among our home folks and even the newcomer expecting to make Florida his home. This industry is yet new and few have gone into it in a strictly commercial way, but at the present time I find many people who are interested in developing plantings of this nature and I be-

lieve that the Horticultural Society can aid materially in fostering such a spirit and at the same time help to establish such an industry on a sound basis. There is a demand for information concerning these crops which can hardly be supplied from our present general store of knowledge. In any new horticultural enterprise the development usually moves slowly, but the time has now arrived when greater impetus should be given to finding out just what can be done with the Avocado and Mango in a commercial way, how these crops can best be handled and what prospects do they offer for the future. Is it a safe and sane policy to invest one's money in commercial plantings of this nature for the future? These are some of the questions that come to the beginner.

Personally, I am optimistic in regard to the future of the Avocado and Mango, and believe that the time is not far distant when these fruits will be as much in evidence on our leading markets of the country as the grapefruit is today. We do not have to go very far back into history to find the grapefruit regarded as a novelty, yet today there are thousands of acres in grapefruit groves and more acres are being planted each year. Why should this not apply to the Avocado and Mango,



within the next few years, especially in those localities where it has been demonstrated that they can be grown. We can not hope to grow Avocados on a commercial scale and sell them for fifty cents to one dollar apiece, and any one going into the industry with this in view, is apt to be disappointed. I do not think I am wrong in the supposition, however, that Avocados can be grown and put on the leading markets at a price that would tempt the average consumer and at a price that would give a fair return to the producer.

There are a number of things we must yet learn concerning the production of the Avocado and Mango before many persons will attempt plantings on a large scale. The soils and locations best suited for their culture; the best varieties to plant; methods of caring for the trees; kinds and amounts of fertilizers suitable for best results; disease and insect pest; available market and methods of marketing the output; are some of the questions that come to those interested in developing Avocado or Mango plantings for the future. We have a scattering knowledge in all of these subjects, but in some cases it does not extend beyond certain local limits. The beginner needs some more or less definite plan or set of instructions that he may follow with some degree of certainty.

The lower east coast has been the first to recognize the commercial possibilities of the Avocado here in Florida. Dade County has the largest commercial plantings in the State and probably the oldest bearing trees. There are two men in this

locality who have done pioneer work with the Avocado and Mango and they are largely responsible for what we know today in regard to the culture and varieties of these fruits best suited to Florida conditions. Mr. W. J. Krome and Mr. Geo. B. Cellon have contributed much to our knowledge of what can be done with these fruits in a practical way. It is here that the industry as such has started and other sections of the State naturally turn to Dade County for information. While this section is first in the production of Avocados and has demonstrated the feasibility of commercial plantings, there are other sections in South Florida where the Avocado and Mango can be grown equally as well. I believe there is just as great a future for these fruits along the lower west coast as there is here on the east coast. On the higher lands and the soils that can be well drained, I can see no reason why the Avocado and Mango can not be as generally grown in Lee County as they are in Dade. Lee County has a climate just as favorable, and a soil in many localities which I believe is better adapted to their growth, if the trees that I have seen thus far can be taken as a criterion.

At present our commercial plantings are few and of small acreages. The doorway plantings are limited to a few seedling trees and but little thought has been given to the Avocado and Mango as a commercial proposition in the past.

Now, however, the people are beginning to consider planting Avocados for the future and they are seeking all the available information on this subject.

We will have our problems to work out as we go along and in many cases can profit by the experiences of the Avocado growers in this section. If the industry develops in Lee County as I anticipate it will, this section should contribute something of interest to the Avocado industry in the future. I believe that by close co-operation and through a free exchange of ideas on the subject, much can be done to rapidly build up a permanent and healthy industry in the growing of subtropical fruits. We have a section of country peculiarly suited for such development, so why not take advantage of the opportunity.

But to return to the subject I am to discuss, "Spraying for Avocado Diseases."

There are three diseases of the Avocado fruit that might prove to be troublesome factors in the production of Avocados for commercial purposes. These are, Black Spot, Avocado Blotch and Avocado Scab. They are all fungus diseases and they were described and treated in the Annual Report of this Society for last year.

Black Spot and Blotch affect the fruit as it approaches maturity, making a worthless fruit for shipping purposes, and both of these diseases may be forerunners of rapid decay. These two diseases are more common on the seedling varieties at the present time, however, Black Spot has been observed to occur on some of the budded varieties to some extent. Avocado Scab occurs on both seedling and budded varieties and this disease attacks the fruit during the early stages of its development. Scab does not affect the interior of the fruit but it mars the

outward appearance of mature fruits and severe attacks may cause a heavy shedding of young fruits or a stunted and misshapen growth.

As plant pathologist of the Florida Agricultural Experiment Station, I had made some investigation of these diseases for two or three seasons past to determine their causes and find some means of control. The preliminary experiments that we previously tried had shown little effect in controlling Black Spot or Blotch. In the spring of 1920 a definite plan of spraying was outlined and carried through the season, which took into consideration the control of each of these diseases. Our plan was to begin about the middle of the bloom period and to spray at monthly intervals over a period in which the fruits appeared to be more susceptible to these diseases. Bordeaux Mixture 3-3-50 or its equivalent was used in the first applications and the 4-4-50 formula in the last applications. The spraying was done with a power sprayer and spray guns. The object of this experiment was to determine the number of applications of Bordeaux Mixture necessary to control these diseases and the time they should be applied to be effective. The results obtained were very encouraging and I think demonstrate that each of these diseases can be controlled by proper spraying.

In the sprayings for Black Spot and Blotch thirty-six seedling Avocado trees were selected in a grove where the fruit had spotted badly during the past few seasons from these two diseases. The trees were large and from fifteen to eighteen years old. The trees were di-



vided into groups of four trees each and each group was treated as a separate unit.

Group 1 was sprayed four times during the season. The first application was made on March 23, spraying directly into the bloom. A second spraying was made April 21. The 3-3-50 Bordeaux Mixture was used in the first two sprayings. A third spraying was made on May 21, and a fourth on June 22, using the 4-4-50 Bordeaux formula, in the last two applications. The first part of August the fruits on these trees were examined and checked over for Black Spot and Blotch. Only 1.6% of the fruit from trees in this group showed slight attacks of these diseases. The infected fruits were found mainly in the tops of the trees and probably were not thoroughly covered with the spray material. A striking illustration of the effectiveness of Bordeaux Mixture in controlling these diseases was brought out by a single tree in this group. This tree had been observed for two or three seasons past and the fruit at maturity was always badly affected by Blotch and Black Spot. This season at the end of the experiment the tree was carefully examined and the fruits checked over, but not a single fruit was found that showed any indications of Black Spot or Blotch. The previous year fully 90% of the fruits on this tree were more or less spotted.

Group 2 received three applications of Bordeaux Mixture during the season. The first two applications were made with 3-3-50 Bordeaux, and in the third the 4-4-50 formula was used. These trees were sprayed first in the bloom,

March 23, again on April 21 and the last application was made on May 21. On the first of August when the fruits were examined 5% were found to be slightly affected with Black Spot and Blotch. The slight increase in the percentage of infected fruits in this case over those in groups 1 and 3 is probably due to failure to thoroughly cover the fruits with the spray solution.

Group 3 was sprayed only twice during the season with the 3-3-50 Bordeaux Mixture. The first application was made March 23 into the bloom, and the second on April 21; 1.2% of infected fruits were found on the trees in this group when the fruits were checked over the first of August.

In the following three groups the bloom spray was omitted and the first application was made after the fruit had set and the bloom had all disappeared.

Group 4 was sprayed three times during the season. The first application was made April 21, using 3-3-50 Bordeaux Mixture. A second application was made May 21 and a third on June 22. The 4-4-50 Bordeaux Mixture was used in the last two applications; 2.6% of the fruit on these trees showed slight infections of Black Spot and Blotch on August 1st.

Group 5 was sprayed twice during the season. First on April 21 with 3-3-50 Bordeaux and again on May 21 with 4-4-50 Bordeaux Mixture; 2.6% of the fruit of these trees showed slight infections of Black Spot and Blotch.

Group 6 was sprayed only once during the season. An application of 3-3-50 Bordeaux Mixture was made on April



21; 18.8% of the fruit on these trees were found to be affected with Black Spot and Blotch on August 1st.

Group 7 was sprayed twice during the season with 4-4-50 Bordeaux Mixture. The first application was made May 21 and the second on June 22. Sixty per cent of the fruit on these trees were found to be badly affected with Black Spot and Blotch on August 1st.

Group 8 was sprayed only once during the season with 4-4-50 Bordeaux. This application was made on May 21. On August 1st when the fruits were examined, 97% were found to be affected with Black Spot and Blotch.

Group 9 was not sprayed during the season and served as a check. The fruits were examined on August 1st and 84% were found to be affected with Black Spot and Blotch. Why the unsprayed trees should show less spotting than the trees in group 8, which was sprayed once, can probably be explained by the fact that two trees in this group showed a marked degree of resistance to these diseases.

In summarizing the results it will be noted that sprayings made in April and May were more effective in reducing the amount of Black Spot and Blotch. Where the April spraying was omitted the disease showed an increase following two applications of Bordeaux Mixture.

For the control of Black Spot and Blotch the bloom spray hardly seems necessary. It appears to me that these diseases can be controlled by two timely applications of Bordeaux Mixture, or three at most. The first spraying need not be made until the fruit is well set, probably

two or three weeks after the bloom has disappeared. A second spraying should follow three weeks to one month later and possibly a third spraying three weeks to one month after the second. I would advise the use of 4-4-50 Bordeaux Mixture which should be made of fresh stone lime rather than hydrated lime.

The above experiment will bear repeating and should be carried through a few more seasons before final conclusions might be drawn, but from the results obtained it seems to me that spotting of the Avocado fruit can be easily taken care of by timely and efficient sprayings. The lime sulphur solutions might work equally as well as the Bordeaux Mixture and they should be tried out along the same lines. I can see no serious objection at the present time, however, to the use of Bordeaux on the Avocado tree.

A similar spraying experiment for the control of Avocado Scab was carried along with the sprayings for Black Spot and Blotch. In each case the sprayings were made on the same dates and the same solutions were used. The scab spraying experiment, however, was conducted in a different grove. The trees were of the Trapp variety and were in their second or third year of bearing. Eight blocks of trees were set apart for this experiment.

Block 1 of ten trees was sprayed once during the season. An application of 3-3-50 Bordeaux was sprayed directly into the bloom on March 23. The fruits were examined on August 1st and 25% of the fruit on these trees showed slight scab infections.

Block 2 of ten trees was sprayed twice during the season with 3-3-50 Bordeaux. The first application was made on March 23 into the bloom and the second application on April 21. Six per cent of scab infected fruits were found on the trees in this block when the fruits were examined in August.

Block 3 of ten trees was sprayed three times. The first application was made on March 23 into the bloom and a second application on April 21. 3-3-50 Bordeaux was used in these two applications. A third application of 4-4-50 Bordeaux was made on May 21. The fruits on this block showed 9% of scab infection.

Block 4 of 15 trees received four sprayings during the season. The first two applications were made with 3-3-50 Bordeaux Mixture and the 4-4-50 formula was applied in the last two applications. The trees were sprayed first into the bloom March 23. A second spraying was made April 21, a third on May 21 and the fourth on June 22. Four per cent of scab infected fruits were noted on the trees in this block.

Block 5 of five trees was sprayed three times. The first application was made on April 21, after the bloom had disappeared and the fruit had set. The second application was made May 21 and the third on June 22. 3-3-50 Bordeaux was applied in the first spraying and the 4-4-50 formula in the last two. Nine per cent of scab infected fruits were found on this block. Through a mistake four of the five trees in this block were sprayed into the bloom during the March spraying and this prob-

ably accounts for the low percentage of scab noted.

Block 6 of five trees was sprayed twice. An application of 3-3-50 Bordeaux was made on April 21, after the fruit had set. A second spraying was made on May 21 with 4-4-50 Bordeaux. Twenty per cent of the fruit on the trees in this block showed scab infections.

Block 7 of five trees was sprayed once. An application of 3-3-50 Bordeaux was made on April 21. Sixty-three per cent of the fruit on the trees in this block showed scab infections.

Block 8 of 12 trees was reserved as a check and received no spraying during the season. Ninety-two per cent of the fruit on these trees were affected with scab and in a majority of cases the fruit was badly affected.

With the exception of block 7 all of the sprayings made in this experiment materially reduced the percentage of scab. I believe, however, that a convenient and effective spray schedule can be made up for the control of Avocado scab which need not include more than three applications of Bordeaux. The bloom spray seems to be essential and should not be omitted. In making such a schedule I would suggest that the first application be made into the bloom during the latter part of the bloom period. A second application should follow in three weeks to one month later and a third application in three weeks after the second. The 3-3-50 Bordeaux will be of sufficient strength to control attacks of scab on the fruit.

# Behavior of the Guatemalan Avocado and the Chinese Mango in South Florida

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Edward Simmonds, Plant Introduction Garden, U. S. D. A., Miami

In 1906 the Department of Agriculture introduced into Florida several Avocado seedlings of the Guatemalan type. Some of these were planted at the Miami garden amongst South American and Mexican types. In 1911 some of these fruited. Fortunately some of the seed were saved and planted; however, at that time there was very little interest taken in this type. The Trapp Avocado was planted extensively until the freeze of February, 1917, when it became apparent harder types were necessary.

Attention was then directed to these Guatemalan seedlings, some of which had fruited and were thought to be hybrids probably crossed with the South American and Mexican types. The seedlings originating here will probably prove to be well adapted and represent a new type well suited to this section. Observations so far show their foliage, pollen and fruit suited to the climatic conditions here. One plant grown from a seed of the Winslow Avocado and fruited out by Prof. P. H. Rolfs, is already being planted. This is a free grower and so far fruits well.

The collection recently secured in Guatemala through the Department of Agriculture represent the best types to be

found there. These are established and some seem well adapted as to growth. Some of them grow well on South American stock and very poor on Guatemala; some do well on both, and some will not grow on either.

The Guatemalan race on its own stock appears so far to be ten days or two weeks later than the South American type in coming into growth in the Spring. It is generally observed at this time, the Guatemala will go very dormant in the winter. Trouble has been experienced in trying to run buds in the winter time.

A large number of Guatemalan varieties have been worked on their own type of stock at the U. S. Plant Introduction Field Station, near Buena Vista. Some are now in fruit and the next cold wave should prove if this is the proper stock for this race. Of course it must be remembered that these stocks coming from fruits raised in the old garden on Brickell avenue are probably hybrids. Some of these hybrids with their unusual vigor may prove better stocks even than pure Guatemalan or West Indian. With the interest the U. S. Department of Agriculture and the several responsible nurseries are taking in the Avocado culture, this fruit has a bright future.



With the resistance of the Chinese Mango blossom to the fungus trouble which sometimes occurs when these trees are in bloom and with the splendid growth being made on its own type of stock, it would seem that this type has a wonderful future for Florida. The early introduction in 1902 of S. P. I. 8701 under the name of Cambodiana, does not seem to have been planted extensively on its own type of stock, attention being directed at that time to the Mulgoba.

Later introductions in 1904 of S. P. I. 11645, which has been named the Saigon and of which several seedlings have been planted at the Plant Introduction Field Station on Brickell avenue, Miami, have shown promise of being worthy of propagation. Seedlings of this strain planted at the U. S. Plant Introduction Field Station, Buena Vista, Fla., in 1918, have made splendid growth on high pine sand.

It is interesting to note this type of Mango is well established in the Philippines under the name of Carabao, and in Mexico being called Manila. It seems to have become a favorite in all countries where it has been introduced; however, it has been learned that this type is not planted on its own stock on heavy clay soil in Cuba, but is generally budded on the East Indian stock. This would seem to indicate by its behavior here that this Mango prefers light well drained soil.

The fact that Florida climate suits the Mango from China should interest many in trying to get seedlings of this type established with a view of getting improved strains of this fruit. It is interesting that one of our leading growers have made a start with 400 seedlings of this Mango. It seems desirable at this time to develop this type, which may make Florida famous for this wonderful fruit.

# Avocados in Polk County

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L. D. Niles, Lucerne Park

The Avocado is undoubtedly the most promising fruit among those bidding for popular favor at the present time; it has overcome much skepticism and now appears in varieties that can be grown throughout most of the citrus section.

It is difficult at present to define the exact climatic and soil conditions most favorable to the Avocado tree, as the different races vary in their adaptability under local conditions.

Taking Polk County for our illustration, it has been demonstrated that as a commercial proposition, the West Indian race which comes from the moist lowlands and sea coasts of tropical America is much more susceptible to frosts than either the Guatemalan, which comes from the highlands of southern Mexico and Guatemala, or the quite hardy Mexican from the table lands of central and northern Mexico.

It is true, however, that there are quite a number of old, large West Indian seedling trees in Polk County, some of which were injured only in 1895. There are two at Frostproof, and others near Winter Haven. One seedling in Polk County measures 12 feet in circumference at 12 inches from the ground and is well over 40 feet in height. All must admit that this is quite a sizeable tree. I estimate the tree to be 40 feet in height.

On March 26, 1921, the tree was nearly through blooming and the indications were for a very light crop; in fact it has always been a shy bearer. While this undoubtedly proves that the West Indian will grow in this section we are satisfied the race is too tender for a commercial planting. However, when one takes into consideration the rapidity with which they renew their fruiting wood, it shows that if one takes the precaution to bank above the bud, even the tender varieties are practical for home orchard planting as they can renew their top and fruit again in two or three years.

Pollock and Trapp trees in our planting at Lucerne Park are fully as large today as before the cold of 1917, and some of them matured fruit last year; proving that they recuperate very quickly from cold injury. As the fruit is excellent and budded trees bear at an early age, a few of this race should by all means be planted near the house for home use.

To illustrate the precocity of the Trapp variety, the following is a summary of tree performance records of some trees at Lucerne Park. This block of Trapps was planted in April, 1912, and this summary shows the average yield per tree per year. In the year 1914 the average number of fruits per tree was 1.30; in 1915, 6.70; in 1916, 34.33. These trees

while injured in February, 1917, fruited again in 1920.

Concerning varieties, would say that after our experience with the West Indian race in 1917, as stated, we secured budwood of the best available varieties of the Guatemalan and Mexican races (including the Guatemalans introduced by Mr. Wilson Popenoe), with which we worked over most of our older Trapp and Pollock trees. We later planted a new test plat budded on three different stocks, giving us a total of over forty different varieties in our groves. Of these some ten varieties fruited in 1920 and thirty-six are holding fruit at present. Some of the results noticed in this test planting which as stated includes trees budded on three different stocks—West Indian, Guatemalan and Mexican, are very interesting; and in the course of a few years should be of value in determining the variety and stock best suited for this section.

I wish to emphasize the fact that some of the Mexican race, including seedlings, while not of commercial value, are most excellent for home use, ripening in summer and early fall, and being quite hardy, they are of great economic value.

This reminds me, everyone thinks of the Avocado as a salad fruit, but really, have you ever eaten an Avocado pie? Take a good Mexican fruit or fruits, according to the size pie you like, and tell the cook to make it like pumpkin or sweet potato pie. The combination is guaranteed to make an Avocado enthusiast.

Speaking of some of the odd results noticed with these varieties, I would like

to tell you the history of one of our trees. During March, 1917, a Pollock tree (injured in February) sent up two sprouts from the root stock. During April I budded one sprout with Taft and the other with Fuerte buds. They both lived and looked so promising that the Pollock wood was removed. Both buds made good growth and are now some sixteen feet in height. While both buds are on the same root system, each year the Fuerte has bloomed during January, while the Taft, on same root, has never started new growth until in March. Another point of interest is that the Fuerte bud matured fruit in 1919 and in 1920 and has a fair crop set this spring, while the Taft bud has not bloomed to date.

Regarding the hardiness of the different races and varieties, would say that we have both Mexican and Guatemalan varieties which withstood the cool spell of 1917, and are fruiting and growing very well today. Consequently exact data as to hardiness had best be left for a future report. At present there appears to be a marked difference in the first start of new growth and in blooming periods. This may be an important point to be taken into consideration later in connection with quality, quantity and favorable ripening season. The hardiness and vigor of the tree will be the important factors in choosing our most valuable varieties.

As previously stated, there are several stock experiments being conducted in this section which are showing some interesting phases. Personally, I believe the West Indian is one of the best and most vigorous growers on land which is suited



to rough lemon stock. By banking above the bud it is undoubtedly sufficiently hardy. We have found a few instances where Guatemalan buds on this stock seem to make an imperfect union; proving a point long suspected, namely, that we have still many things to learn concerning stock behavior.

So far the Mexican stock does not appear suited to this section, because as a rule the bud makes slow growth. Some may think there is contradiction in this statement as many Mexican seedlings here are very vigorous growers and bear heavily. It is, however, a well known horticultural fact that seedling trees, under favorable conditions, will usually make a strong growth. But this is by no means proof that buds from an apparently vigorous seedling will make satisfactory trees when propagated.

In connection with the question of stock there is one point which I deem of the utmost importance. Do not allow the tap root of the stock tree to become injured by being kept in a box or pot which will prevent the tap root from going where nature intended, namely, straight down towards a water supply. I consider this the greatest cause of failures with Avocados. Germinate the seed in a 5x5x12-inch box; and then transplant when the tree is some eight inches high. The tap root will be longer if you plant it where you want your future tree to grow and bud later. Handled in this manner your tree will prove more vigorous, withstand drought and winds and grow better than any root-bound tree can possibly do.

I realize this statement is treading very near some nurserymen's toes, but I wish to modify somewhat by saying that I refer to grove planting more particularly than to trees in small numbers for home grounds, unless one is able to bud them himself. Comparatively few have the tree knowledge to successfully bud Avocados, but for large plantings where best results are wanted the above method is entirely practical.

Would say in this connection that I have an Avocado planting where this method has been tried out and the trees show for themselves. When planted this way the tree will put down a deep tap root, the result being that it will withstand climatic changes much better than if shallow rooted. At first thought this method of developing groves seems more expensive than if handled in nursery rows, but it is more than offset by avoiding the shipping and handling of nursery trees later. Therefore I am confident groves could be developed by this method at less cost and ultimately have better and more uniform trees, for the *tree* is the thing we want. If you don't like its fruit, the tree, being vigorous can be top-worked to any desired variety and will be quite sure to fruit in two or three years.

In addition to the plantings referred to there are a number of commercial size in this section, perhaps the largest acreages being owned by Mr. M. E. Gillett at Eloise, Mr. Mackay at Lake Alfred, Mr. W. D. Carrier at Crooked Lake, and others, totaling perhaps 100 acres.

In cultivation, one of two methods should be followed. Either keep a dust

mulch from the day the tree is planted which will force a deeper root system; or use a mulch of organic matter such as leaves, compost, etc. This will bring feeding roots to the surface, and the danger is that, in a dry spell, unless mulch is very heavy, trees will soon show bad effects from lack of moisture. However, in well drained land, for the first two years after planting, an Avocado tree should have water in anticipation of its wants.

In propagating it would perhaps show wisdom to engage some one who has demonstrated his ability along this line (but perhaps you desire to do this part yourself), very well. Make sure your stock is in thrifty, vigorous condition; do not allow the stock to become too large and the bark to harden before budding, as under such conditions failure is almost certain. With the stock in proper shape, select budwood from the last growth (varieties differ, but usually best results are obtained from fairly mature wood), just before it is ready to start a new growth.

The actual manual performance of budding should be similar to shield budding of the citrus, either in form of a T or an inverted T. Personally I use the T, believing it will form a union nearer the ground. The bud being carefully placed in position, should be at once tightly wrapped with a strip of waxed cloth, covering the entire bud except the eye. Be sure and fasten the end of the cloth, as it is necessary to keep the bud wrapped for a longer length of time than with cit-

rus. After wrapping, judgment must be used to determine whether the stock plant needs the growth slightly checked by cutting away, say two or three leaves near the top of plant. This depends somewhat on whether propagation is in the open or under half shade.

Two weeks after the buds are inserted, depending somewhat on weather conditions, look them over carefully and if the bud is alive, cut off three or four inches of the tip of stock. In another ten days if found alive, judgment must be used in removing axillary buds from the stock, or perhaps taking out a half inch section of bark from the stock about one inch directly above the bud. This will usually force the bud into growth, at which time the waxed cloth must be loosened above the eye of bud; but do not fully remove budding cloth until growth is well started. A point to remember is, if stock growth is checked too heavily, the eye is almost sure to fall from the bud and all your labor is lost. After the bud has made its first growth and the wood is maturing, the stock should be cut back further, tying bud to stem of seedling and removing sprouts, thus forcing all growth to the bud. While dormant during the following winter, stake the bud and remove the seedling stub, covering the cut surface with grafting wax.

In conclusion would suggest that everyone in the citrus section should plant Avocado trees of each of the three races for home use at least; someone sometime will thank you for doing so.

# Avocado Culture in South Dade County

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E. R. Goldberg, Redlands

A great deal has been said about the Avocado and its culture in different parts of the State, as to climatic and soil conditions, and as to type and variety of this fruit.

Avocado culture has been growing in leaps and bounds for the past four years in Dade County, and has been retarded only through the shortage of nursery stock available for planting. Hundreds of acres of Avocados would have been planted if trees had been obtainable. I know of cases where trees were ordered one year in advance in order to get the desired variety. The reason for this, I believe, is a shortage of bud-wood for nursery work. Fruiting of different types and varieties of the Avocado has been carried on by the nurseryman only, so that when a certain variety was found worthy of propagation, the source of bud-wood was very much limited. I hope the time is not far distant when the individual grower will take it upon himself to be of some help along this line, and plant a few seeds of the different races and varieties. In this way he is not only helping the industry in which he is actually engaged, but will be helping himself financially.

Avocado growing in Dade County, from the growers point of view, is indeed a promising one. In making this state-

ment, I do not wish to infer, that we do not have our troubles in propagating this fruit. This, however, is only a natural condition and is one that confronts the grower of all fruits and vegetables.

I am going to give you a few facts taken from experience and observation during the past six years as a grower of this fruit. In doing this I shall confine myself to the district with which I am familiar—South Dade County.

The first question for the Avocado grower to solve is the land on which to make his planting. I would consider any land that is not subject to overflow, or land upon which water does not stand for more than two or three days at a time, as good Avocado ground. The Avocado is a gross consumer of this liquid, but also appreciates a happy medium. I have seen many Avocados destroyed in a very short time from stagnant water around the crown roots of the tree, and I would therefore regard land of this type with suspicion.

The type of land with which we have to deal in South Dade County, is of coralline origin, the rock coming to the surface and intermingling with a red clay soil. This soil is very shallow, which necessitates a preparation of the land prior to planting, for good results. This can best be done by scarifying to a depth



of not less than six inches. Where this method has been tried out it has given excellent results. The majority of the older plantings of Avocados in this section did not have any preparation of the land prior to planting. In a good many cases the tree stumps were not removed, and has proven to be a sad mistake and should not be repeated. Where no preparation of the land was made as stated above, the grower worked out a system of breaking the coralline rock from two to six feet around each individual tree during each year until the entire tract has been broken up. If this work is done in time, or in other words, if the root system has not been retarded to any great extent, the results obtained are very satisfactory.

The distance of planting the Avocado in grove form, should be given considerable thought, as in after years one may wonder just why he left so little room around his trees, in which to do the spraying, fertilizing and the harvesting of his crops. I would not think of planting any trees less than twenty-five feet in the row, and the rows the same distance apart, unless it was the kumquat. As the trees increase in size from year to year, one will find it very convenient to be able to drive down the middle of the rows without coming in contact with the branches of the trees.

Selection of the race and variety of trees that are to be planted is a question that is somewhat trying and often proves to be very expensive to the grower. A profitable planting will consist of trees that will fruit during different months of the year. The reason for this is plain when you consider that about 90% of the

Avocados grown in this section today are fruiting during the months of August, September, October and November.

We have two distinct races—West Indian and Guatemalan—from which to make selections as to variety. The West Indian race has been extensively planted in this county, and has been used as stock in the propagation of the Guatemalan varieties. The Guatemalan race of Avocados has proven to be more hardy than the West Indian, and no doubt will be used as stock in nursery work, if the supply ever exceeds the demand. But with Guatemalan Avocados selling from five to ten dollars per dozen, I see no relief in sight for some time to come, in order to use this race for nursery stock.

In making your selection of the varieties you intend planting it would be well to know if they are climatically suited to your location. This is particularly true of the Guatemalan race, as they come to us from their native home, from far above sea level. Mr. Wilson Popenoe, of the Department of Agriculture, tells us that he had found Avocados growing at an altitude of 8,500 feet. With this information I am not at all surprised at the behavior of some of these varieties when planted a few feet above sea level.

I hope that sometime in the near future the Avocado growers will get together and select a standard as to variety and to season of fruiting. This should be done for the benefit of the present grower, and more so for those who expect to embark in this enterprise.

The following varieties of Avocados have done exceptionally well in this sec-

tion, and I will class them as to season of maturity and race:

*Pollock*.—This is our summer fruit, maturing during the months of August and September, and is of very good quality. It is a large fruit weighing from two to three pounds, and is as a rule a shy bearer. This characteristic seems to apply pretty much to all varieties bearing large fruits. The tree is a vigorous grower, and of West Indian race. It has netted the grower some very good returns during the last two years.

*Trapp*.—This variety has been grown extensively in Dade County, for a good many years, and has been a profitable investment for the grower. Trapp is of West Indian race and is a fair grower and fruiter. We have found that this variety is not an even fruiter, being inclined to put on more fruit than it is able to take care of, and at the same time put on new wood for the next season's crop. This is indeed an objectionable feature, as the tree is very often completely defoliated, leaving no protection to the branches from the direct rays of the sun, and the result is a stunted tree, which takes as a rule a year or more to overcome, and of course the loss of the crop on such trees for that year. I have seen Trapps bear themselves to death during the first two or three years after planting. This can be overcome by thinning out the fruit each season until the tree is strong enough to carry its crop. But you will find that the average grower will not carry this out, as it is like pulling teeth to throw good Avocados on the ground. This variety is also very much affected by Avocado scab. I will not take up time

on this subject, as I think this will be brought out by other members on the program, but would like to say that if you insist on planting Trapps in South Dade County, I would advise that you place your order for a power sprayer at the same time, as you will find it impossible to produce marketable fruit without a system of spraying. I have also found that this variety has a small per cent of loose seeded fruit, the extent of which varies from year to year. This feature is not a desirable one, because the constant shifting of the seed in its cavity is no doubt responsible for the large percentage of decay which occurs while enroute to extreme northern markets.

*Waldin*.—The Waldin is a variety of the West Indian race, which was originated in Homestead, Fla., by Mr. B. A. Waldin and has a very promising future. This is a holiday fruit coming to maturity in November to January. It is a very good grower, and of good quality. The shape is oval, and is of good marketable size, having a tight seed and a tough skin. The tree seems to be more hardy than most of the West Indian race. During the cold winter of 1917 and 1918 this variety did not show any bad effects from the cold, while other trees of the same race (West Indian) adjoining the Waldin were badly frosted. Waldin is a good fruiter, coming into bearing at an early age. I consider this variety as one of our future leaders.

*Taft*.—The Taft belongs to the Guatemalan race, and it has been very much of a surprise to the growers of this section. It is a vigorous grower, making a very symmetrical tree. It is inclined to bush

rather than grow tall, as do most varieties of this type. Taft is a good fruiter, distributing its crop well throughout the tree. It is of good flavor and size, averaging in weight about one pound. It has a tough thick skin which will stand considerable rough handling, making it an exceptionally good shipper. Season February and March.

The Taft has been regarded with suspicion for various reasons, and in some sections I believe they have been well founded. The variety is a very poor grower in the northern part of this county, while with us it is the best grower we have. Taft does not come into maturity at an early age, usually the fourth year after planting. I am satisfied that this variety will be one of our standards.

*Taylor.*—This variety originated in Miami, from a seed that was produced in California. It is of Guatemalan race, and one of the best fruiters we have. While the fruit is rather small in size, I think its season of maturity—January to March—will more than off-set the disadvantage. The quality is not of the best, but fruiting at a season when Avocados are scarce, this variety will bring good returns to the grower for many years to come. The tree is a strong vigorous grower, having a tendency to shoot straight up as do the seedling varieties. The fruit has a small tight seed, and a thick skin.

Taylor trees planted in this section during the past three years have done exceptionally well, and I would certainly consider this variety in making a commercial planting of the Avocado.

*Wagner.*—This variety comes to us from California, and was produced from the same tree that gave us Taylor, being of Guatemalan race. Wagner and Taylor are identical in growth and foliage, while the fruit of these two varieties would hardly reveal their close relationship. Wagner fruit is almost round, and is much larger, weighing from 18 to 24 ounces. It is of good quality and flavor. This variety like Taylor, is an early and exceptionally good fruiter. I have seen Wagner grafts 14 months old, that were put into an old seedling stump, set a crop of fruit that would do justice to a three-year-old tree of ordinary fruiting qualities. Season of Wagner is January to March. This variety has not been planted to any extent in this section, being a recent introduction and having been fruited by Mr. W. J. Krome of Homestead, during the last three years. The color of Wagner is green with a thick brittle skin. Wagner has a good future as a commercial variety.

The above races and varieties of the Avocado are those found in grove form, and have been fruited sufficiently to determine their commercial value. There are a great many other varieties being tested each year, and as the list grows, we find the selection of a variety more difficult.

In setting the Avocado in this section, I have found that placing one-half stick of 40% dynamite in the center of each hole, at a depth of 15 inches, is of much benefit during our dry season. In using this system I would suggest that the hole be filled with small rock and then filled in with soil. In doing this your tree will



not settle below the surface and leave a pocket in which water would stand during the rainy season. I am a great believer in drainage for the crown roots of all trees, which necessitates the setting of your tree, from three to four inches above the level of the ground.

Fertilizing the Avocado is a problem to which many growers have given but little thought, and the results obtained have been very unsatisfactory. The Avocado is a gross feeder, and to do well must be kept in good condition at all times. I know of no tree that responds to good care as does the Avocado; on the other hand, you will find a neglected tree is very much a burden.

The source of plant food best suited to the Avocado is still a question in the minds of some growers. Personally, I prefer the organic mixtures, and have used these with very good results. I have seen Avocado trees upon which plant food from chemical sources was used, destroyed during the rainy season in this section. Avocados in the same district and at practically the same elevation upon which the organic mixtures had been used

for several years, came through without the loss of a single tree. I am not prepared to say as to what caused the damage in the grove where chemical sources of plant food were applied, but I will say, that it looks somewhat suspicious.

In fertilizing the Avocado, I have found that three applications a year, of two pounds each, and two pounds added for each year to each application, will keep your trees in good fruiting condition. The mistake is very often made in fertilizing the Avocado as to size; if you expect to have a planting of even stand and size, I would advise giving the small tree just as much plant food as the larger one, providing it be of the same age.

Mulching the Avocado has been practiced here to some extent, but should not be overdone. Trees that have a heavy mulch the entire year, are inclined to send their feeder roots into this, and as the mulching decays forming humus, it settles leaving these roots exposed. A light application of mulching is very beneficial, but strike the happy medium, as near as you can, for best results.

# The Avocado and Mango on the Sand Lands of Palm Beach and St. Lucie Counties

John B. Beach, West Palm Beach

Mango and Avocado trees seem to thrive well on the sandy soils along the coast in Palm Beach and St. Lucie counties, as evidenced by many old Avocado trees six to eight feet in circumference, and 40 to 50 feet in height, and by Mangos less lofty, but running larger in girth.

The soils, where almost all of these old trees are found, are classified by the U. S. Soil Survey as various grades of St. Lucie sand, Palm Beach sand, and Gainesville sand. Nine-tenths of them are on the former, owing mainly to the fact that this alone has proven suitable for pineapple growing, and this was for many years the only form of agriculture in this region; all the dooryard trees were planted in it. The Palm Beach sand embraces what is locally known as "beach hammock," and lies on the ocean side. It consists of a good percentage of calcareous material, largely organic, with humus, mingled with silicious sand. The Gainesville sand is confined in this section to the so-called "red hammock," underlaid with rock, only occurring on the eastern shores of Lake Worth and Jupiter Island.

On Palm Beach sand the Mango does not seem to thrive so well, bears poorly, and is often troubled with a fungus

blight. Avocados, however, thrive, and make huge, productive trees. Where found on the Gainesville sand, both trees seem vigorous and productive, although there is sometimes a tendency to blight among the Mangos. Of the St. Lucie sand areas, that described as the "yellow sub-soil phase," where yellow or orange sub-soil appears near the surface, is the best for both trees, as is the case with almost anything else planted, either trees, pineapples or vegetables. However, little of the famous Pineapple Ridge in St. Lucie county has this sub-soil.

The other determining factor is the humus content. St. Lucie sand is described as pure silica, with nothing else but humus. In the absence of the yellow sub-soil phase, all depends on the percentage of humus. Hundreds of acres of old pineapple fields, which have been abandoned to grow up in Natal grass and weeds, and which we all hope will some day recover their former productiveness, are at present useless as well as unsightly, and all would be glad to see them producing Avocados. Mangos are easier started, and require very little fertilizer, but not being such money-makers, few care to plant them. We know from the big, old, bearing Avocado trees of the door-

yard plantings of the past 25 to 30 years, that the land will grow them, but it is a question of getting them started. I have talked with a number of people who have been trying this, and it is apparently mainly a matter of water. After the second summer they are sufficiently established to stand any ordinary drouth without need of watering, but faithful watering is required to bring them to this condition. Planting in a basin 12 to 18 inches deep, and at the same time mulching very heavily, seems to be of much assistance; and shading with slatted lath frames, with the top covered over with burlap, seems to be well worth the cost involved. This frame may be covered with old sacks, temporarily, if a frost is threatened during the first winter.

Planting the young trees in a young pineapple field, simultaneously with the pineapples, is a splendid plan, and works out beautifully, as has been often demonstrated with citrus trees also. Carroll Dunscombe, at Stuart, has some Trapp trees which were planted seven years ago in common St. Lucie sand (which is now well supplied with humus) among a field of young pineapples. They look as well as any trees of their age that I have seen anywhere in Florida, outside of custard-apple hammock. He reports them to be very productive, and they appeared to be setting a good crop when I saw them a few weeks ago. He is so well pleased that he plans to plant 50 to 100 acres this year, provided he can get the slips and trees.

In planting out old pineapple fields, it is often an open question as to whether it will pay. If you cannot plant out pine-

apples at the same time to help pay expenses, and provide the surplus fertilizer needed, it may still be worth the trouble and cost to get something growing on the old unsightly field. Avocado trees stand more cold than pineapples, and even if we did not have the old trees to prove it, we could safely assume that fields that had produced pineapple crops successfully would serve to support an Avocado grove, without danger of loss from that factor. L. C. Harbrecht on the north bank of the St. Lucie at Rio, has some very promising Avocado trees, mainly Trapps with a few Guatemalans, which he has successfully brought to the bearing stage, upon one of the highest, sandiest old pineapple fields to be found anywhere. He prefers Solano among the Guatemalans.

Water seems the great factor on these sandy ridges. At the residence of the late John Sorensen of Jensen, there is a row of seedling Avocado trees, planted many years ago, as evidenced by their size. One stands close by the well, and rises to the full altitude of the 50-foot windmill tower, and is easily 50% bigger than the one which comes next to it, and is 20 or 30 feet farther from the well. This apparently tells its own story.

In a grove I am planting a mile west of the shores of Lake Worth on "fine St. Lucie sand, yellow sub-soil phase" (as described by the U. S. Soil Survey), I have this clearly demonstrated. It is an old abandoned orange grove, which was destroyed by fire some years ago, and has been cleared 18 or 20 years, and until I acquired it recently, had been swept pretty regularly by fire every year. One tree,



close to the negro cabin where the family washing is done, is now three times as large as any of the rest, all having had equal advantages of water and fertilizer, aside from the weekly wash water.

Avocado planting on the flatwoods west of the coastal ridge is of course in its infancy, owing to the fact that little of it has been drained even four or five years, and little of that has been drained perfectly for that length of time. However, it looks very promising, so far as we have seen, not only for Avocados, but citrus stock as well. There were 50 Avocado seedlings planted four miles west of here

(West Palm Beach) about eight years ago. They were planted on ridges to keep them out of the water, and have been subjected to frequent inundations at intervals ever since. When about three years of age we had a 15-inch rainfall in 24 hours about August 1st, and water stood within a foot of the top of the ridges for two weeks. This only killed four out of the original fifty, and the others are alive today, and as thrifty and productive as could be expected of trees that have never been properly fertilized or cared for.

# Shipping and Marketing the Avocado

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Hamilton Michelson, Miami

Before proceeding with my subject I wish to state my pleasure in being associated with the Florida State Horticultural Society. Last evening was my first opportunity of attending such a meeting and I wish to state that the discussions presented, represented to my mind no little food for thought. This formation of thought will produce but one result, and that is a crystalization of the thought formed, and the Horticultural Society deserves the strongest support from every community in the State. The subject which has been assigned me—The Shipping and Marketing of Avocados—is of interest to the entire State and especially to Dade county, where the fruit grows to perfection in size and flavor.

The value of the Avocado as a food is equal to that of meat or milk, as the better varieties contain about 20% of vegetable fat; and the most delicate person can partake of them with relish. However, in the North, the Avocado is eaten mostly by the well-to-do classes as its scarcity puts it in the class with luxuries.

Owing to the peculiar nutty flavor the average person does not take to it readily. The taste must be acquired. This accounts to a large degree for the difficulty in marketing large quantities of the fruit. At the present time a hundred carloads of grapefruit and oranges can be sold

where one single crate of Avocados can be disposed of.

We who know the value of the Avocado, feel that it is but a matter of time when the fruit will be as popular, and in as great demand, as the citrus fruit. Systematic advertising is all that is required. This systematic advertising has long since been acknowledged as the making of any article of value. Take the concerted advertising of the California raisins. A few years ago it was impossible to find a market for the small quantities produced; now, after a few years of advertising, all the wine grape vineyards are being converted into vineyards of raisin grapes. Hammer it home, as it were, and your task is accomplished. This same condition existed with the California walnuts. The Avocado is just as nourishing and very much easier digested than either the raisin or nut and is extremely appetizing.

Speaking of appetizing brings to mind an experience which I had some years ago when a brother visited me from California. After giving him a sample of the fruit he replied to my inquiry as to how he liked it: "Well, to be perfectly frank with you, I never tasted anything that resembled Octagon soap more than does this fruit." He further remarked, "I would not give you a dollar for all the Avocados in Dade county." Now he has

me ship them across the Continent to him. We hope the day is not far distant when the Avocados will be taken out of the luxury class and be regarded as a staple, throughout this country as it is in the tropics.

The methods of handling the Avocado are of great importance on account of the extreme delicacy and perishable nature of the fruit. In our early days, dating back to 1911 when the industry was in its infancy, we used a long bamboo pole with a hook on the end to pull the fruit from the brittle limbs which could not be reached with the hand. Some of our seedling varieties tower twenty-five to thirty-five feet in height and the use of a ladder against the brittle limbs is out of the question. So one man would pull the fruit with a long pole and hook while another would watch his chance as the one, two or three-pound Avocado gained momentum on a direct downward line towards him, allowing it, not infrequently to slip through his hands on to the ground and breaking into a dozen pieces or more, and occasionally to drop on top of his head. Now a small canvas bag is attached to the hook at the end of the bamboo pole and the greatest of care is taken in their gathering. Only the perfect fruit, free from all blemishes, is shipped to the fancy trade. All scarred and blemished fruit is shipped to a cull market.

By so watching and carefully grading our fruit, the little business of 1911 has grown to a point where it now handles about 70% of the entire production of Dade county. Shipments are selected carefully as many of the varieties do not carry well; some become soft in twenty-

four hours while others hold up six or eight days. Those varieties that soften quickly are always sorted out and shipped to nearby markets, while the firmer ones are used for the distant markets.

Three styles of packages are used by our concern in making shipments. The one which is considered the standard crate contains about forty pounds of fruit net weight. This package is used more extensively than any other style of crate as it is recognized by the express company as the standard. The next style is the flat crate carrying about half the contents of the standard crate. For some years this flat crate, carrying one layer of fruit, was used in making long distance shipments such as across the Mojave Desert to the Pacific Coast with a great deal of success. As the war came on we were forced to abandon this flat ventilated crate, and after considerable experimenting, we invented a very inexpensive pony refrigerator which could be discarded at the receiving end owing to its cheapness of construction. We found this mode of transportation very successful as the express company was then delivering shipments of ventilated crates in a worthless condition on account of arriving long over-due. This refrigerator, which has its iced compartment immediately over the fruit, saved the day. No matter whether it was on the road ten or twenty days, as long as the crate was properly iced, it carried the fruit in perfect condition. We are now using this style of package in all of our shipments except the immediate South.

Perhaps the greatest difficulty we have to contend with is the importation of Cu-



ban and other foreign Avocados, which are dumped on our markets. Cuba makes no attempt to grade or cull her fruit, nor do we get much protection against the poor quality of fruit which is shipped into our large consuming markets from that country. I know it to be a fact that many of the Avocados that are shipped in here from Cuba are carried in bags, thrown over a horse's back, for a distance of many miles before the already bruised fruit is crated for shipment into the States. When we get protective tariff against this foreign fruit our markets will handle all the fruit that is now being grown, if properly distributed.

In addition to the foreign shipments that flood our leading markets, some of our good growers make bad conditions worse by shipping indiscriminately on consignment. To my mind the consignment of perishables is not the proper method of marketing them. Would a shoe merchant consign his products to some distant points to be sold for his account? Do the California raisin growers ship their products to be sold for what-

ever the market will bring? Or do the nut growers of California ship in this manner? No. Are the tomato growers of Dade county shipping on consignment today? Very few. Why? Because they are being properly distributed and with such equal distribution that the demand holds up.

Just so is our method of marketing the Avocados. We buy and sell upon a plain business basis and never in our ten years of Avocado business have we consigned a crate of Avocados, except culls, that we would not put into our printed wrappers, or an occasional extra crate when the pickers misjudged the amount required for the day's orders and over-picked. We always try to pick the exact amount of fruit each day needed for shipment that day, whether it be fifty crates or five hundred crates. When markets are flooded with consigned fruit the tendency always is to bring the general price down to the level of the price brought by the surplus. Our motto is, "Create your market or sell to one who has created one. Never consign!"

# Some Observations on Avocados in Custard Apple Muck

H. O. Sebring, Sebring

In April, 1919, I paid my first visit to the territory lying on the south side of Lake Okeechobee, known as the Ritta section. The land is a rich custard apple hammock soil, well drained, and has on it a growth of tall custard apple trees, or where these have blown down, a thick growth of elders. We found a hotel at the mouth of the Miami Canal, and from that point visited the section along the lake for a distance of ten or twelve miles, also Ritta Island.

At every home, we found a few Avocados; seeds having been planted, and in every instance, they were growing fine, and some of the stories told us were unbelievable. The oldest tree was on the Sewell place, having been planted in 1910, and at this time was about forty feet in height and eighteen inches in diameter at the base. None of the trees had had any fertilizer, and from appearances, they had had no care. On this immediate shore, there seemed to be no effect of the cold of 1917, as Royal Palms, Avocados, guavas, Australian pines, rubber trees and other tropical growths were doing fine.

We were unable to locate on this trip, any budded stock, and were disappointed with the amount of fruit that had set on the seedling trees, but everyone told us

they had carried heavy crops the year before.

Later, we made a trip to the plantation of Mr. Ed. Forbes on the north end of Ritta Island, and to the grove of T. D. Feister on Kramer Island. We found plantings of Trapps and Pollocks at these places. At that time they were very small, but at this time have attained a wonderful size for their age. The trees on the Forbes plantation, that are two and one-half years old are eight to nine feet in height and have set a crop of fruit of about a box to the tree. And the trees in the Feister grove, which were four years old last September, are eighteen and twenty feet high, and are carrying a crop of seven or eight boxes to the tree. The trees have been given no fertilizer.

Physical development in the Glades is in a pioneer stage. Transportation is very slow and uncertain. The cost of developing and handling fruit is high, but the prospects are bright, as a railroad is being constructed from Moore Haven to Sandy Point; there is talk of a bond issue of \$350,000, for a good road from West Palm Beach to the south side of the lake and on towards Ft. Myers.

During the spring of 1920, we made some purchases at the Sewell plantation,

so that I have been back to this country almost every month since that time. All of the seedlings have produced heavy crops during the years. There is one large tree on the Sewell place that bore a crop of over seventeen hundred fruits, and the indications are that it will have a good crop this year.

I have discovered only one or two Avocado trees of the Guatemalan type in the Glades and they are only three or four years of age. These have produced the same amount of growth that the seedlings and West Indian varieties have. The Winslow variety bore a fair crop in 1920.

The custard apple soil seems to have all of the ingredients necessary for the raising of Avocados and producing good crops of fruit and all interested in the Avocado industry will watch this section closely, for as soon as transportation is improved, a heavy production of Avocados is bound to come from the south shore of Lake Okeechobee.

W. J. Krome: This concludes the program to be offered by the Committee on Avocados and Sub-tropical Fruits, and if there are any questions anyone would like to ask in regard to any of the papers that have been presented along the lines of Avocados or sub-tropical horticulture, the members of the committee will be glad to answer them before we adjourn.

Mrs. ———: I would like to ask what to do for the Avocados and Mangos dropping the small fruit.

W. J. Krome: We have had that trouble at various times in our groves and it

may result from several causes. A very heavy rain during the time that the bloom is open seems to result almost certainly in the dropping of fruit. The presence of either thrips or an infection of the anthracnose fungus will have a similar result. The thrip injury will quite frequently take place, throw off the bloom and in most cases the fruit will not actually set. The dropping from the anthracnose fungus usually takes place about the time the fruit is the size of a bird's egg and seems to be due to a weakening of the union between the stem and the branch upon which it is located. I think that there are several other reasons but those have come under my own observations. Possibly some member of the committee can more fully answer that question.

H. H. Hume: I might say in behalf of the Society that we appreciate very much the program on Avocados which these gentlemen have given us this afternoon. There is no question about the importance of this branch of horticulture in Florida. It is one of the coming things; it has been a long time coming because there have been a lot of difficulties and a lot of unknown things to be worked out but we are gradually getting around to it and I think before very many years we will have an Avocado industry in Florida that will be of first great importance in the horticulture of the State, and these men who are on this platform today are the men who are making it, are doing the work and Florida owes much to that type of pioneers in an actually new field so far as we are concerned.



# The Improvement of Pineapple Soils

Alfred Warren, Ft. Pierce

In the improvement of the soil for pineapple culture two things should be kept in mind; first, the addition of humus, a very necessary part of any soil for any kind of plant production, and second, the control of the nematode.

Humus, although seemingly but scantily supplied on our ridge-land soils, even on the virgin land, still plays a greater part in the growing of the pineapple than most persons believe. It is the humus, though meager in quantity on our so-called typical pineapple lands as compared with that of the rich hammock lands, that gives stability to all productive soils and this applies equally well to our pineapple soils. It helps to retain the moisture, on the sandy pineapple lands, which is a very important feature; it absorbs and holds the fertilizer elements that are applied and releases them as the plant needs them; it furnishes food and a medium for the soil bacteria without which plants could make but little growth; and it improves the tilth allowing better aeration, bacterial action, and other processes that go on in the soil for the good of plant growth. Humus then is one of the prime factors in restoring old pineapple fields or in retaining those that are still fairly productive.

Good illustrations of what the lack of humus does may be found in perhaps any

of the pineapple plantations. Parts of a field for some reason or other may lie fallow and scorch in the sun for a year or more, or a path or an alleyway after a few years' of use may be planted to pines. Such plantings always stand out in glaring contrast to their surrounding plantings by their stunted growth, due to lack of humus and bacterial life.

Next in importance in the improvement of the soil comes the nematode control. The scientists, among whom may be mentioned Dr. C. D. Sherbakoff and Messrs. J. R. Winston and H. R. Fulton, who have given the pineapple problem a great deal of thought and attention for the past number of years and who are still carrying on experiments in St. Lucie county, are still of the opinion that the nematode is one of the chief factors, if not the chief one, in bringing about the so-called pineapple wilt.

In the summer of 1919 Dr. Sherbakoff started some very interesting experiments with the view to either prove or disprove the nematode theory. Briefly his line of attack was sterilization of the soil with steam, carbon bisulfid, and formaldehyde. In addition to these soil sterilization experiments other very interesting and important test plots were started to show the value of selecting strong healthy slips versus poor slips; also the

fumigation of slips before planting versus non-fumigation.

The above mentioned experiments were started nearly two years ago on the A. N. Hoofnagle place, one and one-half miles south of Ft. Pierce. The plants are now bearing their first crop. Three things loom up very conspicuously in these experiments, namely:

1. Cuban slips by far are giving the best results.

2. Of the local slips those chosen for their vigor and from healthy plants are far outranking those that showed weakness at the time of planting or those taken from wilted plants.

3. The plots whose slips were fumigated with hydrocyanic acid gas, at the rate of 2 ounces of sodium cyanide to 100 cu. ft., are superior to those not so treated. Just why fumigation should make such a difference in the growth of the plants has not yet been explained.

With regard to the soil sterilization plots it is yet too early to draw any definite conclusion. During all of the first year the plots, including the checks, looked uniformly well, all plots growing as vigorously as in the days when the pineapple was in its prime on the East Coast. Even during this year, until just recently, the plots appeared to be quite uniform and bore a good crop of large-sized apples. But about six weeks ago the plants of the outside row on one side of one of the check plots began to show some wilt. Just the other day it was observed that the wilting has crept in as far as the fourth row. So far no wilting appears in any plant of the other check plots nor in any of the sterilized plots. As said be-

fore, it is still too early to draw any definite conclusions with regard to the sterilization plots, but in another year some very interesting points may be cleared up.

Although these sterilization plots do not at this time give us anything definite with regard to soil sterilization, yet they bring out another interesting and most important feature in the soil improvement problem. These plots are located in a part of the experimental field that had Natal grass growing on it since 1916. The grass had been left undisturbed, having been neither cut down nor plowed in until just before the slips were planted when the ground was plowed. Each bed, whether treated or not, produced uniformly large and vigorous plants. This vigorous growth cannot be attributed alone to the sterilization of the soil, for the reason that the check plots, until only recently, produced equally vigorous plants. This uniformly fine growth of pines was undoubtedly due, first, to the humus that was restored to the soil by the three years' continuous growth of Natal grass; and second, to the partial starving out of the nematode, as the Natal grass is highly resistant to this dreaded enemy of the pineapple.

This humus theory is further substantiated as follows: Plants growing in another part of the same field, but where the grass was plowed under two or three times a year, are not doing nearly so well as those where the grass had not been disturbed. Likewise on still other parts of the field where more recent plantings have been made under these particular cultural differences, the plants show less vigor in the plots that had the grass

turned under two or three times a year for the past two years than in the plots where the grass was left undisturbed during the three years previous to planting. The explanation for this no doubt is that where the field is plowed and a long dry hot period follows the bare soil is exposed to the hot winds and to the rays of the sun which burn out both humus and bacterial life.

On our pineapple ridgeland in St. Lucie county Natal grass has up to date found no superior in the way of improving the soil by adding humus and at the same time starving out the nematode. Natal grass is drought resistant and will make a good stand even in dry weather on poor soil once it makes a start.

To summarize the salient points that have been brought out by the experiments carried on in St. Lucie county in the growing of pineapples the following may be mentioned:

1. Restoration of humus in the soil by the growing of some plant or plants resistant to the nematode. The different varieties of velvet beans, the iron and brabham cowpeas, and the various grasses are resistant. So far the forage crop that has given the best results is the Natal grass. And so far the best results with this grass have been obtained where it has been allowed to grow undisturbed for two or three years and only plowed under just before the planting of the pineapples.

It may be that equally good results could be obtained by plowing under each successive crop of Natal grass if the plowing could be done just before a heavy

rain or just before the starting out of the next grass crop, thus allowing only a very short period of time for the soil to lie fallow.

2. The control of the nematode. This is but a corollary of the first. By planting nematode resistant plants to restore the humus, the nematode will be controlled at the same time.

3. A definite rotation of crops. For a stable pineapple industry the grower should have a definite system of rotation. After the fourth or fifth crop of pines the field should be planted to some cover crop for one or two years to be plowed under. A plantation could be divided off into say five different plots, and each plot in rotation planted to a cover crop, thus maintaining a uniform acreage in pineapples year after year.

4. The selection of slips. Cuban slips have given good results wherever planted. But since it is next to impossible to obtain slips from Cuba, the grower should pay the closest attention to the selection of local slips. Only slips from strong and vigorous plants should be taken. By continuing such a practice in a few years a strain more or less resistant to the nematode could be developed. Such a scheme should have the co-operation of all the growers.

5. Since the fumigation of the slips by hydrocyanic acid gas has proven in our experiments to make a decided difference in the growth of the plants, it would be well to continue this practice, at least as long as we obtain good results from it, or until we learn why fumigation is beneficial.



6. The proper use of commercial fertilizers as set forth by experimenters along this line.

The experiments that have been carried on and are still being carried on in St. Lucie county by the Federal Department,

by the State Experimental Station, and by the growers of St. Lucie county, are of greatest importance to the pineapple industry. These experiments should by all means be continued until we know definitely just what causes pineapple wilt.

# Pineapple Problems

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R. L. Goodwin, Ft. Pierce

Pineapples have been successfully grown commercially on the East Coast of Florida during over 30 years.

The industry brought about a million dollars annually into St. Lucie county, until 1915, at which time many fields had become old and unprofitable, and a large percentage of the fruit small and unmarketable.

A dying off of plants appeared in many fields. This condition was recognized as "Wilt," something that had always been known on a small scale but not feared up to that time by the growers in St. Lucie county.

The industry had been wiped out gradually in the vicinity of West Palm Beach, but St. Lucie county growers felt that pineapples were exempt from pests or disease and could be grown on the same piece of land indefinitely; that when a field needed replanting all that was necessary was either to remove the old plants and plow the land or grub the old plants under and replant. In some locations fields have been planted three times in 25 years. One field was kept well fertilized and by filling in vacant places from time to time was made to yield profitable crops for 26 consecutive years.

When the war broke out with Germany the shipments of potash were cut off and potash later disappeared from the pine-

apple fertilizers. Consider for a moment that in Florida, in a sub-tropical climate, we have growing a tender tropical plant—the pineapple. We found by experiment that we could harden the pineapple plant by using a good percentage of potash in our fertilizer mixtures so that there was less liability to injury by cold waves. We had also learned that applying ammoniates without potash made the plants tender and very susceptible to injury by cold. Potash not being available except at an exorbitant price, the grower applied only ammoniates and phosphates, such as blood and bone, tankage, etc.

In February, 1917, a frost injured the plants; a year of drought followed, and in December, 1917, another cold wave did damage. 1918 was another dry year and the pineapple grower threw up the sponge when fertilizers became as valuable as gold dust.

In the meanwhile the United States Department of Agriculture at Washington and the State Agricultural Experiment Station at Gainesville were conducting experiments on various plantations to develop a method of control for red spiders, mealy bugs, and nematodes (root knot); and were seeking for parasites and other agencies that might be responsible for pineapple troubles. Plant selection, fumigation, soil sterilization,

disinfection of soil and of plants have been carried on. Natal, napier grass and rattle box have been tried as rotating crops, and healthy plants sterilized, fumigated and planted in 1919 show signs of giving a good crop this season. Plots of ground on old fields have been steamed, and others treated with formaldehyde or with carbon bisulphide. The experiments are being conducted to prove or disprove the many theories that have been advanced and the information obtained will always be of value to whoever grows pineapples in Florida.

An association for the Promotion of Pineapple Culture was formed in July, 1919, and about \$1,500 was raised to help the State carry out its experimental work. The treasury is at low ebb at the present time, but money will be forthcoming in same way. The work must not stop!

There are fields that went through the cold spells of 1917 with little injury, and were fertilized normally that fruited well last year and the fruit brought high prices. A few fields that were cleaned off and allowed to remain fallow in 1917 and 1918, were replanted in 1919 and at the present writing the plants are full of

bloom and promise a 90% crop. The plants look healthy. One field, belonging to D. T. McCarty, is located on Riverside Drive, Dixie Highway, one mile south of Ft. Pierce, and is observed by every one passing. One company has made contracts to replant a thousand or more acres of pineapples during the coming season and there is hopes of the industry being restored.

The land immediately adjoining and overlooking the Indian River is in demand as winter resident sites, and the location is beautiful with about 35 feet elevation above the river and a hard asphalted road over which all automobiles pass to and from Miami and Palm Beach.

Many acres of the old pineapple belt will never be planted to pineapples again. Other crops such as limes, guavas, avocados, pigeon peas, cassava and nursery stock have been planted and will produce an income.

Local pineapple plants are very scarce and high in price, but plants will be imported from other parts of the world, and in a few more years the pineapple industry will again be an important factor in Florida's upbuilding.



# A Fertilizer Program

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S. F. Poole, Lake Alfred

Any material added to the soil to produce crops and maintain the soil strength may be termed a fertilizer. This being the case any real fertilizer program for our groves and farms has a double purpose to fulfill: (1) To retain and add to the soil reserves, and (2) produce the maximum of crops.

*Soil reserves.* At all times during the production of the crop (and in a citrus grove this means twelve months every year), there must be sufficient plant food to properly feed the tree. This plant food should not be too readily soluble, for during periods of wet weather the absorption by the trees together with leaching, would remove too much plant food from the soil. Then would follow a period when the trees could not secure sufficient food to continue operations.

The grove man, following a system of fertilizing at stated intervals, is often at a loss to understand why his trees do not always maintain their usual healthy condition. I have in mind a number of groves that, two years ago this summer, illustrate this very condition. At that time we had all through June, July, and during the most of August a rainy season such as I have heard the old settlers tell about. By the first of September the rains shut off and two months of dry weather followed. By the middle

of July these groves were seriously affected by withertip as evidenced by a considerable dropping of fruit. By October the situation was really serious, with from 25 to 50 per cent of the fruit on the ground and the trees full of dead wood. Groves that had been fed a less readily soluble fertilizer weathered this trying period in safety. In these latter instances the soil had sufficient stocks of food in reserve to carry the trees along.

Soil reserve should be maintained; or in other words, keep food before the tree at all times. No bank can do business without capital. Add to this, for as your capital increases so grows your ability to transact business. With the citrus grower this spells bigger crops and better fruit.

The trees require certain kinds of food from the soil and these should be supplied by the fertilizer in proportion to the needs of the tree, the fruit and the deficiencies of the soil. There should be provided for the trees the food they need to produce complete growth and fruit.

A complete fertilizer is so termed when it contains ammonia, phosphoric acid, and potash. These three are named because they are the three elements of which a Florida soil is usually deficient. They are also regarded as the most active in fostering growth and production of crops. The other elements that are necessary

but are found in the soil in sufficient, though small quantities are sulphur, lime, magnesium, iron, etc.

Ammonia is the element that produces growth. The spring and early summer is the best time to apply fertilizers having relatively high percentages of ammonia. It is best to wait for the removal of the fruit before applying high percentages of this element; yet I have seen growers apply four and even six per cent of ammonia in February and then wonder why their late fruit became course and green before the time for shipment arrived. It would have been better to wait until after the fruit was picked before using stimulating applications of ammonia.

Potash is necessary for the formation of sugars and wood and for the transfer of these compounds from one part of the tree to another. It is held that photosynthesis cannot take place without potash. It is commonly understood that potash produces a thin, tough peel, making a fruit better fitted to withstand the shocks of transportation.

*Soil Conditions.* Let us turn back to the soil again. Four things are requisite for a satisfactory fertilizer program: (1) Proper type of land; (2) Water; (3) Humus; and (4) Soil bacteria.

(1) *Type of Land.* The trees should be planted on land adapted to citrus trees. The high pine lands of the Winter Haven section are a good example. These lands are high, well drained, and well aerated. The sub-soil is clay located deep enough to provide space for the tree roots and moisture is easy to retain. Groves have been set on flat woods and sand scrub lands in this section but the returns are

not commensurate with the effort expended.

(2) *Water.* The citrus tree like all plants uses its food in solutions as dilute as the fraction of one per cent. The sap of the tree is very dilute, the only approach to concentration being found in the fruit and seed. There is a constant stream of water flowing through the tree day and night. Large quantities of water are required for a tree to carry on its vital functions. When the amount of water in the soil gets low, or in other words, when the solutions of food in the soil become too concentrated, the trees wilt. They are unable to get sufficient raw materials for their requirements.

(3). *Humus* is decayed vegetable matter thoroughly incorporated into the soil. Its presence in the soil makes it easier to retain moisture and encourages the growth of living agents. There are two ten-acre groves in our section that were planted side by side on the same kind of land seven years ago last winter. One grove man has kept his land virtually clean the year round. The other man has not. His grove is clean during the dry season and full of grasses and beggar-weed during the rainy season. Today the trees in the grove where clean cultivation has been practiced the year round are fifty per cent smaller than those in the other grove. The amounts and quality of fruit bear no comparison. The grove kept clean during the dry season only has produced three times as much fruit.

(4). *Soil Bacteria.* Last but not least, are the soil bacteria. These are the agents that convert the crude materials of the soil

into forms that are soluble and beneficial. The helpful soil bacteria cannot do their work unless they have plenty of humus and an abundant supply of fresh air and water. Conversely land that has no soil bacteria is dead and will not produce satisfied grove owners.

The soil may be compared to a factory in which the: Building is the inert particles of soil; labor, the bacteria; raw materials, the water, air, solvents and humus; capital, the fertilizer; finished products, the products absorbed by the tree roots.

A good fertilizer program requires a

consideration of all these factors. Nor is the case as simple as this presentation might lead one to think. These factors are entirely dependent upon each other for the absence of any one interferes with the health of the trees.

Let us sum up briefly:

Apply fertilizers to the soil that are congenial to the tree and sufficient to build up the soil reserves, and see to it that the soil bacteria have a chance to flourish. I know this is not always an easy thing to do, that there is danger in straying from the straight road.



# Humus, Fertilizers, Lime and Fertilizer Inspection

Dr. H. J. Wheeler, Boston, Mass.

## HUMUS

Before entering upon a discussion of fertilizers and their use, it is of first importance to speak of humus; since, if the soil is not adequately supplied with humus, plants cannot make their best growth, neither can fertilizers exert their maximum effect.

What is needed in Florida soils is not organic matter which has reached the most advanced stage of decomposition, but rather organic matter *in the various stages of decomposition*. I have known soils exceedingly rich in organic matter, a large part of which had decomposed to such an extent and was in such a state that it could be dissolved from the soil by treatment with ammonia water; and yet these same soils were very unproductive because of the need of organic matter in the earlier stages of decomposition. In general it is probably safe to state that the richer the plants are in protein, the chief nitrogenous constituent, the more quickly they decompose. On this account many of the non-legumes decompose rather more slowly and furnish organic matter in the various stages of decomposition for a longer time than the legumes do. Young and tender legumes decay very rapidly. In fact, they act almost as quickly as sources of available ammonia for

plants as do certain of the well recognized organic materials, such as tankage and cottonseed meal.

I recall experiments made several years ago, in which I grew the perennial flat pea for two or three years on the same land and then turned the crop under and sowed barley. The barley was much better than it was on adjoining land where flat peas had not been grown previously, and the crop appeared to be abundantly supplied with nitrogen. The next year, however, there was no appreciable increase in the crop where flat peas had been turned under a year before as compared with the plot where no flat peas had been grown. This showed that the nitrogen contained in the flat peas had practically all been utilized by the crop which followed or that it had been transformed into nitrates which had leached away.

For crops or plants which may be injured by the presence of too much nitrogen, particularly toward the close of or just following the rainy season, it might be better in some cases to use non-legumes as cover crops, rather than legumes. It is generally recognized, that certain crops or plants are more affected by various diseases if the plants are over-fertilized with ammonia at certain stages

of their growth, than if they are supplied with properly balanced plant food which does not carry an excess of ammonia.

Another point in connection with legumes ought to be mentioned. Everyone recognizes the importance of getting nitrogen out of the air and of utilizing legumes wherever they can be utilized to advantage. Until quite recently some mistaken notions have existed in regard to the amount of nitrogen which they fix from the air; since, as long as there is present in the soil an abundant supply of combined nitrogen in forms which the plants can utilize, they take it up instead of assimilating atmospheric nitrogen to any considerable extent. Recent experiments in the Middle West have shown where legumes and non-legumes have been grown side by side and then removed from the land, that the soil has been made poorer in nitrogen where the legumes were grown than where the land was devoted to non-legumes. Even if the crops are left on the farm and are returned in manure, a large percentage of the ammonia is finally lost before the plant residues in the form of liquid and solid manure are returned to the land. On this account, if one wishes to add to the soil the greatest amount of nitrogen from atmospheric sources, the legumes must be grown on land which is not already rich in combined nitrogen, and they must then be plowed under.

When plant residues are applied to the soil, the complex nitrogenous compounds which are contained in them are soon broken up through the activity of bacteria and the other naturally-existing micro-organisms of the soil. While these

changes are taking place, some plants are able to assimilate directly certain of the more simple organic nitrogenous compounds, comparable to those produced from hair, wool, and other complex organic nitrogenous compounds when subjected to suitable factory preparation and treatment for fertilizer uses. The greater portion of the nitrogen, however, is transformed into ammonia by the agencies just mentioned, which in turn is transformed in the soil into nitrous acid and finally into nitric acid. This nitric acid then enters into combination with potash, soda, lime, or magnesia, from which it is taken up by plants unless lost in the drainage waters. In Indiana even aluminum nitrate has been known to be formed in soils to such an extent that it became poisonous to vegetation. In other words, this compound may act in the same way as certain of the other soluble aluminum salts.

The various changes in plant residues take place more readily in soil well supplied with moisture, and at fairly high temperatures, than in rather dry soil, especially when the temperature is low. The formation of nitrates is said to occur most actively at a temperature of about 98° F.; hence, in many cases soil near the surface in summer becomes too hot for the most rapid formation of nitrates.

It is not necessary from the standpoint of the plant that all of the nitrogen, aside from the small amount which is taken up in simple organic forms, be changed into nitrates; for at least many kinds of plants at certain stages of their growth are able to use some nitrogen while still combined

as ammonia. On the other hand, if there is too great and sudden a formation of ammonia, owing to the conditions being unfavorable to its transformation into nitrates, there is a possibility that ammonia may in some cases accumulate in the soil to such an extent as to be injurious to plants. In a word, the most important problems in connection with the feeding of plants are the selection of the proper plant foods and the compounding of the various materials in such proportions as will insure a proper and adequate supply of all necessary plant foods to meet the plant requirements from seeding time until full maturity is reached.

Even if fertilizers are supplied in adequate quantities and of the right analysis, it is also important to have the right proportions of the different materials used in the mixtures. This may best be illustrated by citing my own experiment with fertilizers in Aroostook County, Maine. I found it possible to produce 30-40 bushels more of potatoes per acre with one fertilizer than with another, even when an analysis of both would show the same percentages of ammonia, available phosphoric acid, and potash. The factors determining the difference in yields in these cases were the kinds of materials and their availability. Thus the difference in the value of the product from an acre of land produced by the two fertilizers having the same analysis was enough in most seasons to pay the entire cost of the fertilizer used. It is because of these important considerations that a careful study of soil and climatic conditions and of soil and plant requirements is necessary in or-

der to manufacture fertilizers which will give the best possible results.

#### FERTILIZERS

*Ammonia.*—I notice that the previous speaker spoke of ammonia as that ingredient of the fertilizer which “produces plant growth.” I know it is a more or less common practice nowadays to speak of nitrogen, or ammonia, as that which causes growth, of phosphoric acid as that which produces the seed, and of potash as the fertilizer ingredient which causes the production of starch, sugar, and cellulose. We must not forget, however, that there are at least ten different plant foods, all of which are important to the proper functioning of the plant; and if any one of these is entirely lacking, the plant will not thrive. Therefore, iron, magnesia, and lime are as necessary to growth as nitrogen is. We are led, however, to think of nitrogen as especially necessary to growth for the reason that when it is deficient in a soil, plants generally take on a light or yellow color and present an unthrifty appearance. And yet, I have seen Indian corn which looked as light-colored and unthrifty as a plant possibly could, when supplied with everything a plant requires excepting iron, but which, as soon as iron was supplied, recovered its normal green appearance and thrived perfectly.

Another important consideration in connection with the use of fertilizers is their effect upon the soil. Nitrates, for example, are subject to ready loss by leaching on sandy soils if heavy rains occur, and nitrate of soda in particular



tends to deflocculate clay soils and seriously injure their physical condition. On acid soils nitrate of soda tends gradually to correct the acid condition; and if the soil is of such a physical character that it is not likely to be injured by the residual sodium carbonates, the after effect from the use of nitrate of soda is beneficial.

Sulphate of ammonia is not so subject to leaching as nitrate of soda; yet if it were used as the exclusive source of nitrogen on a highly calcareous soil, there is a possibility that so much ammonia would be liberated at once that some of it might escape into the air and be lost, or even, under such conditions, cause direct injury to plants, many of which are very sensitive to its presence in large quantities. Sulphate of ammonia also tends to make soils acid on account of the fact that the ammonia is largely changed to nitric acid in the soil, which further adds for a time to the marked acidity created by the residual sulphuric acid that was combined with the ammonia at the outset.

Calcium nitrate and potassium nitrate are both subject to ready loss by leaching in open sandy soils in case heavy rains occur. For crops which are greatly in need of lime, especially when they are grown on acid soils, calcium nitrate has distinct advantages; whereas for certain root crops which can use some soda, in case the supply of potash becomes deficient, nitrate of soda may be a more efficient or better source of nitrogen.

If calcium cyanamid is introduced into fertilizers in small amounts under certain chemical conditions, the nitrogen may be largely transformed into urea, a most valuable organic source of nitrogen

for plants. On the other hand, if it is introduced into fertilizers under other conditions or in large quantities or if it is applied directly to the soil under the usual conditions, large amounts of dicyanodiamid are formed from it—a compound which is highly toxic to plants. It is on this account that calcium cyanamid of itself is usually considered unsuited for use as a top dressing or direct application to growing crops or trees. It is on this account, also, that it must be applied two to three weeks before the seed is sown in order not to injure the young rootlets.

There is a possibility that in the near future ammonium chloride may be placed on the market as a source of ammonia. If this occurs, it will have to be used with even more care than sulphate of ammonia, especially on acid soils.

The important feature in connection with fertilizers is to have such quantities and such proportions of various materials used as to exert the best and most favorable influence upon plant growth, taking into account, also, the effect of the fertilizers upon the physical and chemical condition of the soil. It is possible with a clear understanding of these points to use such proportions, for example, of certain nitrates, ammonium salts or other materials, as to avoid the ill effects which may arise from their exclusive use as sources of ammonia; for when combined in the proper proportions and in a proper manner, the various drawbacks mentioned may be largely or wholly avoided, by making the effect of one substance counteract the unfavorable effect of another.

A further interesting phase of the nitrogen problem is that of denitrification,

or the destruction of nitrates within the soil. It has been proved by the most painstaking experiments that if a soil becomes water-logged up to a certain limit, nitrates instead of being formed or conserved in the soil, begin to undergo decomposition, especially if the soil contains considerable amounts of fresh manures and certain other kinds of organic matter in the early stages of decomposition. This change may go only so far that ammonia is formed; or it may even progress to such an extent that the major part of the nitrogen existing in nitrates already in the soil or applied to it in fertilizers, may be changed into gaseous form and thrown off into the air. The nitrogen would then be in the same form as the nitrogen in the air which we are breathing in this room at the present moment, and it would be of no more use to plants than the naturally-existing free nitrogen already in the air. A very small part of the nitrogen under these conditions is transformed into organic material consisting of the micro-organisms which bring about this change. Thus it is important that soils be properly drained. If they are not, organic material which has considerably decomposed or which has been well composted is far safer than organic material in a less advanced stage of decomposition, since the latter is capable of supplying a greater amount of nutriment to the denitrifying organisms.

*Phosphoric Acid.*—In regard to phosphoric acid, it is a well-known fact that in Europe in the early days no such thing as superphosphate, or acid phosphate, was known. Due, however, to the work of Von Liebig during the latter part of the

first half of the preceding century, it was shown that the crop-producing efficiency of ground bone was very greatly increased by treating it with sulphuric acid (oil of vitriol). Still later phosphate rock, which is a far less effective source of phosphoric acid than bone when both are untreated, was also subjected to the same treatment, whereupon it was found that the available phosphoric acid, thus produced, was as efficient a source of plant food as if it had been produced by treatment of bone with sulphuric acid.

Ordinary bone and phosphate rock consist chiefly of tricalcium phosphate, sometimes called a "three-lime" phosphate. In the manufacture of superphosphate (acid phosphate) either from phosphate rock or from bone, it is customary to add enough sulphuric acid to combine with two of the three atoms of lime, so that only one atom of lime remains in combination with phosphoric acid. This remaining compound containing only one atom of lime is soluble in water, supplying what is known as "*soluble phosphoric acid.*" The other two-thirds of the lime in the bone or in the phosphate rock are changed into land plaster, or gypsum, which remains in the mixture. This, therefore, the farmer secures without cost, since the charge for the superphosphate is based merely upon the percentage of available phosphoric acid.

It has been found in some of the states on the Pacific Coast and elsewhere that sulphur, even in such combinations as land plaster, or gypsum, is very helpful to the growth of certain plants; and it is not at all impossible that the sulphur contained in the land plaster, associated with



acid phosphate, or dissolved bone, is often of some use to plants. It may not only serve as direct plant food, but, to a certain extent, the gypsum may act as a liberator of potash; and if ammonia happens to be present in the soil in the form of carbonate, it may react with the ammonia so as to change a part of it temporarily into sulphate, in which form it is non-volatile and cannot escape into the air and be lost.

Two great advantages are derived from the use of superphosphate, whether made from bone or rock, namely: (1) it is soluble in water and hence can be taken up immediately by the plants, and (2) it becomes better distributed in the soil if applied in soluble form than if applied in its untreated natural condition. To be sure, much of the soluble phosphoric acid, upon application of a superphosphate to the soil, is soon changed into less soluble forms, known as "reverted" or "back-gone" phosphoric acid. Its efficiency, after this reversion has taken place, is determined to a considerable extent by the character of the soil and the relative proportions of the various substances with which the soluble phosphoric acid can combine. For example, if the soil contains large quantities of aluminum and iron oxides, and little or no available lime, there is a tendency for much of the phosphoric acid to enter into combination with the iron and aluminum and for but little of it to enter into combination with lime. It is on this account that it is advantageous to make small or moderate applications of lime from time to time to soils where superphosphates are to be

used, provided crops are grown which are not subject to injury by liming. For citrus fruits, unfortunately, lime must for other reasons be used with exceeding care and in very small quantities if at all.

Much has been said and written in recent years about raw rock phosphate, or, in other words, regarding phosphate rock which has not been subjected to treatment with sulphuric acid; and many extravagant claims have been made concerning its efficiency as plant food. It is of some agricultural value even without treatment, on certain soils, and its greatest efficiency is observed when it is used on acid peat or muck soils. The next best soils on which to use it would be upland soils which contain large amounts of acid organic matter. However, for most crops and soils throughout the greater portion of the United States and especially in the east along the Atlantic seaboard, no other form of phosphoric acid has proved equal to superphosphate prepared from bone or rock phosphate by treatment with sulphuric acid. It has been found, for example, that if the raw rock phosphate is used on land which has been recently limed or which naturally contains a considerable amount of carbonate of lime, its efficiency is very greatly reduced or in some cases practically nullified, for the reason that the acids of the soil or those contained in the rain water or produced as a result of nitrification and fermentation are likely to attack the carbonate of lime before they can exert any material solvent action on the raw rock phosphate. It is for this reason that soft phosphate, which generally contains much carbonate



of lime, is often less efficient than it would be if it were entirely dissociated from carbonate of lime.

When soluble phosphoric acid reacts with lime, it first forms dicalcium phosphate or, in other words, a two-lime, or reverted, phosphate. This is still very available to plants; for even though it is not directly soluble in water, it is readily dissolved by the action of plant roots and by water containing carbonic acid, such, for example, as rain water and the natural soil waters, which derive their carbonic acid from the decomposition of the organic matter of the soil.

The chemist determines in the laboratory the amount of water-soluble phosphoric acid and also the amount of reverted phosphoric acid and refers to the sum of the two as "available" phosphoric acid.

Another source of phosphoric acid, which was used in this country somewhat extensively before the war, is basic slag meal, or Thomas phosphate. This was produced in the manufacture of steel from phosphate of iron by what is known as the "basic" process. The phosphoric acid in this material is largely combined with lime in a different combination from any of the other phosphates mentioned, and some iron, manganese, and free lime are also present. As concerns the availability of its phosphoric acid, it is somewhat inferior to superphosphate. It is, however, superior in this respect to untreated bone meal and is much superior to raw rock phosphate or soft phosphate. Its availability to plants depends very largely upon the conditions under which it is manufactured, and certain basic

slag meals produced in some European works before the war had a very low availability as compared with that produced in others. Thus the source of the basic slag meal, or Thomas phosphate, may be a very important consideration from the purchaser's standpoint.

Another new source of phosphoric acid is the so-called "ammo-phos," which is a combination of ammonia and phosphoric acid. This is a material which is as yet but relatively little known in agricultural circles. It must be used experimentally under varying conditions and with a large number of different kinds of plants before one can state definitely the conditions under which it can be used to the best advantage, or can be sure of its real desirability and of the efficiency of its phosphoric acid as compared with phosphoric acid in superphosphate.

During and since the war many processes have been patented for the preparation of phosphates for agricultural use from raw rock phosphate by different methods involving fusion with various substances; but as yet none of these products has apparently been able to hold its own in competition with superphosphate, either by way of efficiency in crop production or economy of manufacture.

In connection with my experiments, especially in the Middle West, I have been astonished to find that as small amounts as 90-150 pounds of a relatively low-grade fertilizer, containing high percentages of phosphoric acid, have given increases of 8-15 bushels of wheat to the acre, 15-40 bushels of oats, and 10-25 bushels of corn. In one case 100 pounds of fertilizer were used to the acre for

sorghum. The sorghum was then manufactured into syrup from both the fertilized and unfertilized areas with the result that where no fertilizer was used, the yield of syrup per acre was 67 gallons; and where fertilizer was used, the yield was 140 gallons. This syrup was worth at that time from 90 cents to \$1.45 per gallon; hence, the gross gain even at 90 cents would be \$65.70, from which there must be deducted only the very small cost of the 100 pounds of fertilizer in order to show the net profit from the fertilization.

Such increases often seem to be more than might be expected from the mere plant-food effect of the fertilizers; and it appears possible that in addition to furnishing plant food in immediately available form in close proximity to the young rootlets of the plants, the fertilizers may also have a corrective effect by way of overcoming the toxicity of certain substances which may be present to an injurious extent in some of these soils. Furthermore, it is now known that fertilizers have a very marked stimulating effect upon the development of certain of the soil bacteria upon which soil fertility is very largely dependent. In connection with the first point raised, attention should be called to the fact that Conner, Abbott, and their associates in Indiana, found that in some soils aluminum nitrate was present in sufficient amounts to be toxic to plants. This is a substance which is decomposed by either lime or superphosphates; and wherever such compounds are present in the soil, the application of fertilizer containing superphosphate would be expected to make the con-

ditions more congenial to the development of young plants. Similarly, at the Rhode Island Agricultural Experiment Station, Hartwell, Pember, Damon, and their associates, have found that where sulphate of ammonia was applied to the soil for a series of years as the exclusive source of ammonia, aluminum sulphate had been formed in the soil in sufficient amounts to render the soil unable to longer support the growth of various kinds of crops. It had previously been shown by the author of this paper that the existing toxicity, regardless of its cause, could be entirely overcome by the use of lime. More recently it has been demonstrated by Hartwell, Pember, Damon, and their associates, that exceedingly large applications of superphosphate are also capable of overcoming or greatly reducing the toxicity of the aluminum sulphate; and this is due to the fact that the phosphoric acid upon combining with aluminum, changes it into a very insoluble form which the plant cannot assimilate. Ruprecht, while at the Massachusetts Agricultural Experiment Station, found soluble, or toxic, aluminum salts present in certain soils. It appears, therefore, that this is a condition which we have but just begun to recognize in this country. In fact, it is not improbable that certain soluble salts of the protoxide of iron may have similar effects, which superphosphates are able to correct.

Where sufficient quantities of soluble aluminum salts exist in the soil to prevent utterly the growth of onions, beets, lettuce, spinach, upland cress, asparagus, cabbage, cauliflower, and, in fact, a large number of other kinds of plants,

there are still others which can thrive on such soils without difficulty. I refer particularly to one of the flowering perennials, *Silene orientalis*, which thrive to perfection where most of the plants enumerated above died before they had made materially more growth than was possible from the stored-up food material in the seed. The blackberry, for example, grew well on such soil. The Lima bean was also able to make a fair growth, whereas the Golden Wax and other varieties of string beans were partial failures. Watermelons grew splendidly, whereas the cantaloupe practically failed. Other plants were found to range between these extremes.

*Potash.*—For most crops it is more or less immaterial what the source of the potash is, as long as it is soluble in water, or is available to the roots of plants. However, citrus fruits, tobacco, sugar beets, and hops are illustrative of noted exceptions. The usual potash sources are muriate, which contains about twice as much chlorine as potash; high-grade sulphate of potash, which contains little or no chlorine; kainit, which contains two or three times as much chlorine as potash; and the double manure salt, containing both sulphate of potash and sulphate of magnesia, and but relatively small quantities of chlorine. It is the aim of progressive fertilizer manufacturers to supply those forms of potash for special crops which are adapted to the kind of plant to be fertilized.

#### LIME

There are soils in Florida which contain a great abundance of carbonate of lime, in fact, far more than is desirable. On the other hand, there are some soils which are so acid and deficient in lime that its application is one of the first essentials to success. For citrus trees, as stated before, lime should be used with extreme caution, if at all, for we are well aware of its various ill effects on citrus trees of all kinds. But if any lime is used for citrus trees, one should probably employ only a small part of what is indicated as necessary to completely neutralize the soil; whereas, if one were growing cantaloupes, lettuce, spinach, beets, and many other truck and field crops which are greatly benefited by lime, liming approximately to the full limit of the quantitatively determined requirement may prove helpful.

I have been much interested in what one of the speakers has said regarding die-back; for in connection with an experiment which I have been conducting with oranges here in Florida, die-back was markedly increased where magnesian lime was used three years before at the rate of only one ton per acre. The disease was even worse when practically pure lime was substituted for magnesian lime. The die-back was also accompanied by wither-tip and frenching. The trees in the same experiment which received no lime were far less affected with die-back. Die-back was also present in



an adjoining grove in which all the trees were subsequently treated with bluestone (copper sulphate). Since it was my desire to ascertain to what extent different lime and fertilizer treatments would affect die-back, no bluestone was used on the three experimental areas. Nevertheless, die-back has now very largely disappeared. If bluestone had also been used on the experimental trees, it might have been inferred that the disappearance of die-back was chiefly or wholly due to the bluestone. In view of the circumstances, however, it is evident that climatic or other conditions were responsible for a good part of the improvement observed.\*

I do not mean by this that I would not advise the use of bluestone as a means of combating die-back, for it seems, at present, to be the best-known remedy for this disease. It must, however, be used with care and moderation or trees may be injured by it. I say this, notwithstand-

ing that in some cases unusually large amounts have been used without injury. In the course of my travels for several years through the citrus sections of this State, covering in all many thousand miles and visits made at different times of the year, I have not found anyone who has been able to tell me positively all of the different causes of die-back nor how it can always and surely be avoided. Apparently, there may be several causes. At any rate, everything which can be done to throw light upon any one or more of these causes will be of material help to the citrus industry. It is for this purpose, among others, that the company with which I am connected is conducting several experiments in this State with citrus fruits on different types of soil. We cannot expect that the citrus industry of Florida will ever attain its highest and fullest development until the mysteries connected with the die-back problem have

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\*As the discussion following this paper was drawing to a close, one of Florida's authorities on citrus diseases, citrus culture, and especially on the use of bluestone, disputed the statement that die-back had largely disappeared without treatment, saying that he had visited the grove mentioned and found that this was not the case. I thereupon stated that what I said was based upon the report of a man also familiar with Florida and its citrus problems, rather than upon my own examination, although I had observed a marked general improvement in the grove. Soon after the meeting at Miami arrangements were made through Professor Newell to have the grove carefully examined and reported on by Mr. Gomme, county agent and citrus expert of Polk County, who reported as follows:

**Section 1. No Lime.**—Not as heavy growth as in Section 2 or 3. Slight indication of frenching. Hail has damaged young fruits—also young and old wood, causing the wood to split considerably. Fruit irregular in quantity. No S-shaped growth apparent. No indications of die-back by gum pockets or multiple buds. This section could not be recorded as having die-back.

**Section 2. Limed Area—Magnesian Lime.**—Hail damaged fruit and branches as in Section 1. Small amount of frenching. Growth in general is better than that in Section 1 or 3. S-shaped growth is present in almost all trees but there are no indications of die-back by gum pockets or multiple buds. This section shows vigorous and healthy growth.

**Section 3. Limed Area—Non-Magnesian Lime.**—Die-back present on a few trees which show gum pockets, multiple buds, frenching, and brown exudation on wood. This condition is not extensive, although it is marked on a few trees. The fruit and wood had been considerably damaged by hail. As in 1 and 2, the damage seems to be more marked on the younger wood.

**The Grove Across the Road from the Above Three Sections.**—This grove has been treated with bluestone. No die-back is apparent though a few S-shaped branches were noticed. There has evidently been die-back in this grove at some earlier period as some of the old wood is stained, but no gum pockets or multiple buds were found on the younger growth.

been more fully explained. Until we know more of the causes and of the means of avoiding this disease, we shall be in essentially the same position as the physicians and veterinarians who were attempting to combat yellow fever and malaria in the human family, and the Texas fever in cattle, before the relationship of the mosquito and the tick to the transmission of these diseases was definitely ascertained. Most thorough and careful experiments should be made on every different type of soil used in this State for the growth of citrus trees, and this seems to be one of the greatest needs of the citrus industry in Florida at the present time. It is not enough to have one experiment station, but experiments should be conducted in all of the important citrus districts in which different types of soil are represented.

#### FERTILIZER INSPECTION

Before closing, I wish to say a word about the fertilizer law in Florida. I trust I may be able to qualify as a competent witness for the reason that I was for four years connected with the fertilizer inspection in Massachusetts, and for more than twenty years had general charge of the chemical work connected with fertilizer inspection in Rhode Island.

I notice that there is a tendency in some states to require the manufacturer to name the sources of the materials used in his goods. In this connection it should not be forgotten that requirements of this kind are of no use whatsoever, unless the chemist can substantiate or disprove the claim of the manufacturer. Further-

more, such requirements are often contrary to the best interests of both the purchaser of the fertilizer and the manufacturer.

For example, there are a considerable number of materials rich in nitrogen which, in their natural, untreated condition, are generally known to have a relatively low crop-producing value, but when properly treated in the fertilizer factory, are capable of transformation into materials as valuable as or in some cases even more valuable than the best organic ammoniates with which we are familiar; such as, dried blood, tankage, and cottonseed meal. If the manufacturer is obliged to state that these materials are used, it is likely to create a prejudice against the fertilizer, whereas the fertilizer really will be of very superior quality if these same materials are subjected to proper factory treatment at the outset. Furthermore, after treatment, the nitrogen may be present in compounds entirely different from those existing before the treatment was applied. Such requirements are about on a par with the requirement that a manufacturer of turpentine must state that he used long-leaved pine in his product. It is true that special crops seem to be of better quality when certain ammoniates are used than when others are employed, and any manufacturer with his future at stake strives to furnish that which will give the best results. It is of great importance to know the availability of the ammoniates in the fertilizer; but it can do no one any good to state *what they were once, what they are not now, and what they never will be again.* A law of this character, which requires the mak-



ing of statements that would be misleading to the purchaser, is in many respects worse than no law at all.

If I were to state that I used hair or wool in a fertilizer, the purchaser, knowing the low value of each in its raw or untreated state, would think that the fertilizer was inefficient. However, I can take the hair off your individual heads or the wool off the backs of your sheep (with your permission) and, by chemical treatment in the fertilizer factory, transform it into material as valuable as, or even more valuable than, the best organic ammoniate known. After such treatment it would certainly no longer be hair; but it would consist of a very large number of different nitrogenous compounds, many of which no chemist could practically hope to identify in making a fertilizer analysis, and much less determine quantitatively. In fact, if, under such circumstances, I were to state that hair was used, I should be telling you that something was there which was really not there.

I mention these points merely as illustrative of tendencies in connection with some recent fertilizer laws to require statements which are useless, absurd, positively misleading, and contrary to the best interests of the user of fertilizer. If you wish to know the source of potash in a fertilizer, a chlorine test in addition to the test for potash will usually tell all that is required. If you wish to know the real crop-producing value of a fertilizer, a determination of the percentage of available phosphoric acid and potash, and the availability of the nitrogen as shown

by the most reliable chemical methods known, affords the best possible means of protection for the purchaser. In those states where this plan has now been in vogue for several years, the results have been most acceptable to the farmers.

I wish also to say a word about the collection of samples of fertilizers. It is to be presumed that the object of a fertilizer inspection is to set forth the actual facts as to the quality and analysis of the fertilizer. This being the case, it is of the utmost importance that samples be so drawn that they will truly represent the fertilizers which are being inspected.

If you were to make up a fertilizer containing bone, tankage, and various other materials, including potash salts, nitrates, sulphate of ammonia, and similar materials, you might find, no matter how accurately the mixture had been made, that some of the lighter materials in the mixture would tend to come to the top of the bag when shaken up in transit or handled in the storehouse. Consequently, the only way that a truly representative sample can be secured is to have it drawn with a sampling implement which extends the entire length of the bag. The sampler should not be opened until it has been fully inserted. It should then be opened throughout the entire length, filled, closed, and then withdrawn. Such sampling-rods are in existence and are used exclusively in many of the states. These secure a true core of fertilizer extending the entire length of the bag. A perfect mixture of such cores will give a true test of the character of the goods, if properly handled and analyzed.



It is also important that samples be drawn from such a number of bags as will properly represent any given lot of fertilizer. If there is a small number, all should be sampled; and if there are many bags, samples should be drawn from not less than 10-20% of those present. Great care must also be taken in properly mixing the samples after they are drawn, so that a uniform, composite sample can be secured for analysis. If I were merely to draw a sample of fertilizer with my hand from the tops of bags in a shipment and were to send it to your state chemist for analysis, the chances are that he would report that the analysis did not agree with the guaranty. Imagine for a moment that each of you is a manufacturer and I the purchaser. You will appreciate the position in which you would find yourselves, if I used such an analysis as a basis for non-payment of the goods and as a means of having the goods confiscated. It must be obvious that such a situation as this would add to your overhead costs in the manufacture of fertilizers and to the prices which you would have to charge me for them; or the alternative would be that you would be driven from business in this State.

My conception of a fertilizer inspection is that it should be conducted in such a way, and the law should be so drawn, that it affords protection to the purchaser and at the same time protects the honest manufacturer from injustice, imposition and the perpetration of fraud on the part of any dishonest purchaser; in other words, the inspector of fertilizers should be backed by a just law and should stand as an absolutely neutral party, seeing to it

that absolute justice is done to both producer and consumer. No other plan is as good for either the purchaser or the manufacturer.

#### DISCUSSION

Question: Mr. Chairman, the speaker has already remarked that too much lime may be injurious to citrus fruits. Now I wish to ask if too much iron, too much magnesia or too much of other materials would be injurious, and at what point the limit should be set?

Answer: In regard to iron there may be a situation where, on account of large amounts of moisture and organic matter, an oxide of iron may be formed which, in certain combinations, may possibly be injurious to plants. We know, for example, that in some of the peat and muck soils of Holland and England, protosulphate of iron has been found in such quantities as to be destructive to vegetation. There are instances on record where soils contained so much magnesia as to be injurious or almost sterile; but this is doubtless inconceivable in the case of Florida soils, since most of them contain very little magnesia, so little, in fact, that I suspect some magnesia may be beneficial for some crops under certain circumstances. It is true that excessive amounts of certain plant foods may be injurious; but I do not think we have reason to fear the use of too much, especially in view of the present high prices, which have unfortunately placed too great a curb upon their purchase.

Plants differ very widely in their susceptibility to injury by excessive amounts of certain salts of iron, magnesia, and

other substances, which may be present in the soil. A concrete illustration is afforded in connection with experiments which I made several years ago in Rhode Island. It was found that soil which had possibly never received any fertilizer treatment was exceedingly acid and contained substances so toxic to lettuce, spinach, beets, onions, asparagus, and many other crops, that they could not be grown successfully, and the application of a highly acidic fertilizer further accentuated the difficulty; yet other plants grew to perfection on this soil. I mention this merely as an illustration of the fact that we cannot conclude necessarily from the effect of a given substance or substances upon one kind of plant what the effect will be upon others.

Question: What do you think of cottonseed meal as a source of ammonia?

Answer: If you get meal which does not contain an undue amount of cottonseed hulls, it generally has a fairly high availability, although it is not so quick in its action as the ammonia in dried blood, tankage, and dried fish.

Mr. Beech: What can you say regarding calcium cyanamid? I am aware that it is considered to be destructive to plant nematodes. I also understand it carries a considerable amount of lime and that it should be applied some time in advance of the date of seeding.

Answer: It is undoubtedly true that this material is destructive to nematodes; but in order to prove highly effective in this respect, it would have to be used in far greater quantities than should be recommended in ordinary agricultural practice, especially in view of its high content

of nitrogen and lime. The material does have the advantage of supplying some lime, providing the plants grown and the soils used require it. It is also true that dicyanodiamid is formed from it when it comes in contact with moisture in the soil; and this material exerts a poisonous action upon plant roots until it, in turn, is decomposed by the micro-organisms and by chemical changes taking place within the soil. In general it should be applied two or preferably three weeks before the seed is planted. It can be mixed with fertilizer in small quantities under such conditions that practically all of the nitrogen is transformed into urea, which is a most excellent source of ammonia for plants. Under other conditions of manufacture, dicyanodiamid may be formed, so that here again the skill and experience of the manufacturer come into play.

Calcium cyanamid has been found to be highly injurious to workmen who are brought extensively into contact with it in its natural state, especially if they have been imbibing alcoholic liquors. And I may add that I am not bringing this up as an argument in favor of prohibition, even in this dry city.

Mr. Gray: Just a question in relation to bluestone. There are thousands of barrels of it used annually in this State; and in connection with your experiment, you show that the recovery of the trees was not necessarily due to bluestone. Where there are thousands of dollars at stake in connection with die-back, what would you advise a grower to do if the disease appears?

Dr. Wheeler: I should by all means advise its use, until a time when some-

thing better is found as a remedy or until we know how to prevent the disease. However, I should also advise great care in its use and the application of relatively small quantities. I hope some day we may know more about it and how it acts. Until we do, we cannot use it most intelligently.

Question: I wish to ask what results would be secured by the application of sulphate of iron to the leaves of trees which show lack of color, or frenching?

Dr. Wheeler: I think it is impossible at this time to predict surely what effect spraying with protosulphate of iron would have. Pineapples have been sprayed with it successfully in an extensive way in the Sandwich Islands on soils which contained excessive amounts of manganese, and where the plants were not able to secure enough iron under the usual cultural conditions. Upon spraying the leaves, the plants absorbed the iron and developed a healthy color and normal crops became possible.

In Porto Rico, Gile found that lime caused chlorosis and a bleaching effect on pineapples, which was overcome by spraying with protosulphate of iron. This result indicates that the addition of lime to the soil rendered the iron so insoluble that the plants were not able to take up enough of it. Recent successful experiments have been made in spraying conifers with protosulphate of iron. Repeated sprayings with a 1% solution caused certain kinds of pine trees to develop normally and to develop good color, whereas the use of a 2% solution resulted in positive injury to the trees.

It should be determined at the outset by a few careful experiments what strength may be used on citrus trees without injury. The next problem will then be to ascertain whether frenching can be overcome to any extent by such spraying. Doubtless the results will depend upon what causes the frenching; for, according to many observations by our best authorities, it seems to be caused by several different conditions. It would be of the utmost interest and importance to have spraying experiments made with protosulphate of iron and possibly with ferric chloride wherever frenching has followed an application of lime, in order to ascertain if the condition can be corrected. In Porto Rico, Gile found that several successive sprayings were necessary in order to accomplish the wished-for results with pineapples; and obviously the finer the spray and the more generally it is distributed over the leaves, the better the results should be.

I should like to ask if anyone in this audience has sprayed with protosulphate of iron and, if so, with what result. I ask for the reason that about four years ago I suggested the idea of spraying with it to some of the members of this Society who were present at our meeting at Arcadia. I am not aware that any of them ever followed up the suggestion.

In general it has been found that when protosulphate of iron is applied to the soil, it is not so effective in overcoming chlorosis, or frenching, as it is when it is sprayed on the leaves, and very large quantities may often be necessary to cause material benefit if the application is made



to the soil. This is probably for the reason that lime and other basic compounds in the soil may make the iron insoluble as soon as the two compounds are brought into contact with each other.

Answer from the Audience: I have made experiments in spraying with protosulphate of iron, where the trees were very much frenched and bore small fruit, and the result from one to three sprayings was excellent. In other cases it apparently did little or no good, but I presume the conditions giving rise to the frenching were different in the two cases.

Another answer: About four years ago, one or two acquaintances of mine had groves which showed frenching, and they suspected that this was due to a lack of iron; and after spraying them with protosulphate of iron from three to six times at rather frequent intervals, a marked improvement in the trees resulted.

Another answer: I have noticed cases of frenching in the Indian River region where it seemed probable that too much fertilizer had been used, and I am satisfied that you must have a satisfactory amount of humus in the soil in order to get the best results from fertilizer.

Dr. Wheeler: I have had my attention called to cases of frenching which may have been caused by too much water and also by too deep cultivation and injury to the feeding roots. This injury to the roots results especially in cases where a

deep cutting disc or cutaway harrow is used instead of the acme harrow which works the soil only to a slight depth.

What has been said about the importance of humus in the soil is deserving of special attention, since it is fundamental to the best results in growing practically all kinds of crops, including citrus trees. The humus may also play an important part in connection with the assimilation of iron. It is well known that where great accumulations of vegetable matter come in contact with sands containing iron, the iron is often so largely dissolved out that the sands become greatly bleached. This shows that the humus has a solvent action on the iron. It is much better to maintain conditions in the soil, if possible, which will prevent frenching than to take the chance of curing it after it appears.

Another point concerning which I would utter a caution is in regard to making spraying experiments with protosulphate of iron on a large scale at the outset. My advice would be to determine in a small way on a few branches, or at least on a few trees, what strength of protosulphate of iron will be tolerated without injury to the foliage or trees. By proceeding cautiously in this way, no great damage can be done; and after this point is determined, you can then spray extensively with reasonable safety, provided you find it helpful.

# The Branch Experiment Station

Wilmon Newell, Gainesville

A Branch Experiment Station, to be devoted primarily and essentially to the study of citrus problems, has been established near Lake Alfred, in Polk county, Florida. This is a branch station of the University of Florida Agricultural Experiment Station at Gainesville and, like the latter, is under the exclusive control and direction of the Board of Control. The branch station has been established in accordance with the provisions of Chapter 7379, Approved June 4, 1917. This Act authorized and directed the Board of Control "to locate, establish and maintain a Branch Experiment Station, in or near Winter Haven, Polk county, in the citrus growing section of the State, where insect pests, diseases and other agencies, affecting the production of citrus fruits and citrus trees shall be studied;" provided, that no branch station should be established until lands, moneys, groves and other things of the value of not less than \$10,000 should be donated for the use and purposes of the Branch Station.

By the summer of 1919, donations and subscriptions to this amount were secured by a committee of Polk county citrus growers, consisting of Messrs. S. F. Poole, J. A. Snively, J. H. Ross, H. W. Snell, L. L. Davis, A. M. Tilden, C. H. Thompson and W. L. Drew. The Board

of Control shortly thereafter, on July 14, 1919, held its regular monthly meeting at Winter Haven and, in connection therewith, visited and inspected various proposed sites for the Branch Station, finally deciding upon an 84-acre property located on the Dixie Highway, about one mile northeast of Lake Alfred and forming, at that time, a part of the holdings of the Florida Fruitlands Company. This tract of land was donated for the purposes of the station by the Florida Fruitlands Company, the Board of Control merely refunding out of the cash donations made, the actual cost of planting and bringing the 14½ acres of grove on the property to its condition at time the property was transferred to the Board. This amounted to \$5,900.00.

From December 1, 1919, to March 1, 1921, there has been expended on the property in fences, clearing, fertilizer, established seed beds, superintendent's salary, etc., the amount of \$3,005.53, so that on March 1, 1921, there remained, out of the original donation of \$10,000.00, a balance of \$1,094.67. Since the latter date the Florence Villa Packing Association has paid over to the Board, for the Branch Station, \$1,282.15 and the County Commissioners of Polk county, \$2,500.00, so that the total cash resources (as of date March 1, 1921), out of

which running expenses are paid and for permanent improvements are \$4,876.82.

On October 1, 1920, Mr. John H. Jeffries was appointed superintendent of the Branch Station and has given the property his constant and efficient attention since that time.

As a citrus property, the Branch Station is almost ideal. For the most part the land is sandy, typical of the Ridge Section and the topography gently rolling. As stated above,  $14\frac{1}{2}$  acres are in citrus grove. About 12 acres have been cleared and will be devoted in part to citrus and in part to ornamental grounds, seed beds, etc. About  $17\frac{1}{2}$  acres are in meadow and marsh and the remaining 40 acres are as yet uncleared. It is undoubtedly in the latter area that the principal experimental work with citrus will be conducted.

You will bear in mind that no appropriation has been made for the Branch Station, that no federal funds are available for use in connection with it and the total resources have consisted and still consist of the donations mentioned above. Under such circumstances work has had to proceed slowly. Nevertheless, considerable has been accomplished in the way of preparation for the serious business yet to come. Since acquisition of the property by the Board of Control about 12 acres of land have been cleared, plowed and placed in good tilth, about half the total area has been placed under substantial fence, seed beds laid out, and a small tool house constructed. Through the kindness of the City Council of Lake Alfred a road running the full length of the property, along its east side, has been sur-

face with clay. Dr. R. W. Ruprecht, Physiological Chemist of the Experiment Station, is conducting on the Branch Station property a study of the cause of die-back and for this purpose is utilizing the young 10-acre grove consisting of four varieties.

It appears advisable, before proceeding with the clearing of the main tract, and with the platting and planting to citrus, to have a thorough soil survey, topography survey and biological survey made of the entire property. The information recorded by such surveys may go far, in future years, in explaining the outcome of experiments. We have not the funds now to make these surveys and they will have to wait upon legislative appropriations, but this work should precede all of the experimental work proper, as forming a proper basis for it. We do not want hap-hazard results from the Branch Station. We also have in mind giving careful consideration to the planting, so that plats strictly comparable as to drainage, soil and past floral history will be obtained. This calls for careful study, based on the preliminary surveys and, doubtless also, conferences with various citrus authorities. Do not be surprised therefore, if the plantings on the Branch Station do not show up with incredible rapidity, for it is going to be our policy to "make haste slowly" and, as far as possible, avoid undoing, in future years, things hastily done in the beginning. Kindly remember too, that we intend to have at Lake Alfred an Experiment Station and not a curiosity shop or a tropical fair.



The plans of the Board contemplate the early construction of a cottage for the superintendent, the cost of which can largely or entirely be defrayed out of the funds now in hand. In addition, as funds become available, it is planned to install a unit electric lighting plant and waterworks and sewage plants. As far as possible, these will be made models of what such outfits should be for typical and up-to-date Florida country homes.

The lines of experimental work to be taken up, when all is in readiness, will be greatly varied, including such research projects as variety tests, insect and plant disease problems, propagation methods, etc. One can see at a glance that there are unlimited opportunities for investigational work with citrus in Florida and all of the experiments and problems suggested by the growers cannot be taken up at once. On the contrary, attention must first be given to those problems most crying for solution or which presents prospects for prompt solution with results immediately applicable by the majority of growers. The establishment of the various citrus plats and the building and equipment of a laboratory, in addition to the superintendent's cottage, will open the way for co-operation with various workers of the U. S. Department of Agriculture and there is no doubt but what many co-operative experiments will be conduct-

ed at the station. In fact, some preliminary arrangements in this direction have already been made.

So far as actual research work is concerned, the Branch Station is now virtually "marking time," waiting for the legislature to provide for its needs. As a matter of information, you will be interested in knowing that the Board of Control in its budget shortly to be presented to the State Legislature, will ask for the following funds for the Branch Station:

Salary of superintendent, 2 years	
at \$2,000 -----	\$ 4,000
Current expenses, including labor,	
experiments, etc., 2 years at	
\$5,350 -----	10,700
Permanent improvements, includ-	
ing laboratory building, water	
supply, fencing, etc., per an-	
num at \$8,300 -----	16,600
<hr/>	
Total for 2 years ending June	
30, 1923 -----	\$31,300

It is well to remember, too, that no federal support for the Branch Station will be forthcoming at any time: the Branch Station is exclusively a State institution and if the legislators do not provide for this promising infant it must necessarily meet an early and untimely end.

# An Example of Non-Cultivation in Citrus Groves

H. B. Stevens, DeLand

I have been asked to say something about planting and cultivating a citrus grove. I presume it is desired that I tell of our experience at DeLand in the growing of trees on the high pine lands where the trees were left standing.

About ten years ago, we decided late in the winter, to move some of our trees. As it was then too late to clear the land or even thin out the pine trees, we planted our orange trees among the pine trees without removing any of them. These trees have done well and during the cold of 1917 we found the pines a great protection. They bear every year and the fruit is fine in quality. We dug holes to plant the trees, but have not plowed, harrowed or even hoed the ground. The only cultivation that they have received is the mowing of the grass when necessary. We use a mineral fertilizer and scatter it on the ground, without working it in. We find that these trees do not take any more fertilizer than those planted in the open.

This first grove having done so well, we set other groves among the pines, in every case thinning out the pines to some extent because we thought the first grove had too many in it. In none of these groves have we done any plowing, or harrowing, either before or after we planted the trees.

In our older groves that had been plowed for years, we have adopted the same practice of non-cultivation. We now fertilize and do nothing more. We mow as often as it is necessary to keep the grass and weeds from making seed. By cutting in time, we make them give back to the soil what they have been gathering from the air, thus enriching our land by that much and supplying plenty of humus. The shading of the ground is also a benefit. Having followed this plan for a number of years, we find our fruit has better quality in addition to the good carrying trait of pine land fruit.

The number of times we mow, depends on growth of the grass and weeds; when they are high enough to cut we cut them; no matter how many times. I think four times is the most we have ever had to mow our groves in any one season.

In the fall we make fire lines around our groves, as we did when we plowed, and I do not think there is any more, if as much danger, of fire under this plan, than in the cultivated groves. As the grass and weeds are cut green, they rot quickly, and leave nothing but the stubble, which does not burn easily.

My observation has been that the soil is looser before it is plowed than it ever is after it has been broken up; except immediately after plowing. In addition, plow-

ing allows the growth of foreign weeds and grasses which take up more moisture, and make more work than the wire grass if the ground is left undisturbed. In 1877 I set out some trees in hammock land, and as I was very anxious that they do well, during the next spring I grubbed a circle around the trees and beyond the ends of the roots. During the second year I went back to grub a larger circle and found that I was cutting large roots that had grown beyond where I had grubbed the year before. I saw that those roots did not need any loosening of the ground, so I did no more grubbing.

We gave our young trees about one pound of fertilizer to each tree, three times a year during the first three years.

During the fourth year the amount to each tree was increased to three pounds, and applied three times during that year. We think now it would have been better if we had given two pounds to each tree at each application during the third year instead of only one pound, though the trees grew well and looked healthy. In the spring of the fourth year, we noticed some purple scale getting on the trees, which was the reason for increasing the amount of fertilizer so markedly at that time. We have found that a little additional fertilizer generally rids the trees of purple scale, but an over dose may cause die-back. We have no die-back in our groves at present.



# Practices in Groves Planted on Low Hammock Soils

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C. T. Pattillo, Shiloh, Florida

I am going to be brief so that when I have finished I may have time to sit back and listen to the discussion of the subject which I hope will follow. This I know will be both interesting and instructive to myself as well as to other owners of low hammock groves. It is not the purpose of this paper to discuss practices which may be applicable to types of soil other than the low hammock. In such a discussion it would be well to give a short definition of the term "low hammock" and to begin the discussion with the clearing of the raw land.

The term "low hammock" is generally applied to a body of land covered with a heavy growth of cabbage palmetto, oak, maple and other hardwood trees and usually requiring considerable drainage. The top soil is black or grayish in color and varies in consistency from a heavy muck to a light sandy loam, all types being sometimes mixed with marl or lime rock and containing a great deal of natural humus. The sub-soil is often of marl or lime rock, which varies in depth from a few inches to several feet.

Clearing is generally accomplished by underbrushing the small growth, cutting down or digging out and burning all

hardwood trees but leaving a large proportion of the palmettoes, which afford considerable frost protection to the grove.

After staking the ground for trees, mounds are prepared, and will vary in height and diameter in accordance with the elevation above the water table. When necessary the sub-soil is first broken up by blasting. These mounds should be left three to six months before planting, to allow the ground to become mellow. At time of planting the mound is practically torn down and rebuilt, all roots and such material being carefully raked out. It is also advisable to dig down several feet through the sub-soil, afterwards filling this in with surface dirt. In selecting the tree to be set preference is usually given to those budded or grafted on sour orange root. The actual planting is very much the same as is practiced in any grove except that the trees are always somewhat elevated.

Cultivation for the first few years may best be accomplished by flatweeding and hand mowing, for generally the ground will be found too rough for mule or tractor. After that time the disc harrow, well blocked up so that it may cut only about two inches deep, will be the principal implement for cultivation, plows be-

ing almost never employed. As a rule only one or two light cultivations a year are given with the harrow, this being done early in the spring. At the same time, the harrow is running the trees may all be circled with the weeding hoe or they may be spot-hoed, that is, hoeing the trees which need stimulation and allowing the others to go unworked.

From the time that cultivation ceases until midsummer the weeds and grasses are kept mowed, after which time they are generally allowed to grow until mowing is resumed in the fall.

Fertilizing is different in the amount of ammonia used, three per cent usually being considered sufficient. Preference is very often given to fertilizers of purely chemical origin or base. The amount used per acre is less than on the lighter types of soils, there being present more natural plant food and less chance for that which is put on to leach away.

Spraying is not often necessary in low hammock groves because the friendly fungi thrive in the moist atmosphere and with very little help will control the whiteflies and the scale insects. Rust mites are rarely found on this type of grove.

Drainage is discussed last here but in the grove it should emphatically come first. I want to place a great deal of emphasis upon drainage, for on that more than on any other one thing depends the building and maintaining of a successful low hammock grove. If the grove has just ordinary treatment in every other way but sufficient and proper drainage, the trees will be pretty sure to have on them a bountiful supply of thin, smooth skinned fruit of a good color and a delicate flavor, and which, best of all, will sell in the markets for a premium.

# The Planting and Cultivation of Groves in the Ridge Section

Max Waldron, Crooked Lake

One of the outstanding characteristics of citrus culture in Florida is that there exists a wide range of opinion among growers regarding the most satisfactory methods for developing a grove. Few industries exhibit such a lack of standardization; few such a profusion of mere notions. An important duty, therefore, of this Society is to standardize our grove practices wherever possible or where reasonable differences of methods exist to indicate why these are necessary. It is to avoid confusion of ideas, then, that this paper is limited to certain grove operations in that part of Florida known as "The Ridge." It will be found, however, that even though these statements are confined to well defined and uniform conditions, there will still exist many differences of opinion on such matters as the depth of planting; sources, amounts and time of fertilizing; time of plowing; methods of pruning; mowing of cover crops; treatment of diseases, etc. These opposing opinions add zest to the already fascinating game of citriculture and serve as an incentive for constructive competition. In the efforts to demonstrate the effectiveness of our own methods, we incidentally do other things tending to benefit a grove that might otherwise be neglected. However, under present economical conditions, it is especially neces-

sary that we standardize our methods and reduce our operating expenses wherever it will not result in decreasing the vigor and capacity of the grove. Thus, for instance, one California Exchange packing house reduced the size of lemon wraps one inch each way, thereby saving \$6,000 in one season.

Nowhere, perhaps is the citrus industry so thoroughly standardized as in the Ridge Section, for many of the groves there have been developed and are being successfully handled by large corporations who adopted to a great extent the methods established by Dr. Inman, the father of the citrus industry in Polk county.

The "Ridge" is the backbone of Florida, extending from Haines City to Sebring, and like all backbones, is in the form of a series of elevations and depressions, the elevations being the rolling pine-clad hills and the depressions the wide and limpid lakes over which the cold winter winds are moderated to such an extent that the grower scarcely fears the frost. This backbone, however, is constructed mainly of sand instead of lime as are other backbones; in fact, there is so much sand on the Ridge that it seems to have become an integral part of the settlers there, resulting in a phenomenal development where a decade ago



there was a tractless wilderness. Several of the largest citrus projects in the world, together with thousands of smaller acreages, have made the Ridge of such major importance from a citrus standpoint that it is well for us to consider the methods obviously successful there.

Too much care cannot be exercised in the planting of a citrus tree; it rapidly becomes very valuable and will live through many generations. The planting of it is one of the least expensive items in its long history, yet faulty setting often causes trees to be weakened or stunted for years before the cause is recognized, or it may result in physiological disturbances, bringing losses far greater than the cost of more careful setting. If one has occasion to let a contract for setting his trees it might be best to let it to the highest bidder instead of to the lowest. It invariably pays well to get the soil in the best of tilth before setting trees, preferably allow it to lie over for a season, but at any rate thoroughly pulverize it and remove the roots as the accumulation of roots and bunches of grass prevent the soil from settling well about the tree roots when planted, as well as causes it to dry out.

The most important consideration in planting a grove (aside from the soil) is to select good trees—trees with grey-green bark, vigorous looking buds, and a dense mass of fiber roots. The experience of planting many thousands of trees has proven conclusively that invariably the ones which die or do poorly are those having a deficiency of fiber roots. The presence or absence of a tap root seems to be of little consequence, but if a tree

is weak on fibers you will be farther ahead to throw it away. Be merciless in culling out doubtful nursery stock; be merciless again after the tree has been set and made its first growth. All trees have enough vitality in them, if alive when planted, to push out a preliminary growth; in fact this would occur even if the roots were cut off, but if the growth the first year is not strong and vigorous it would be best to discard the tree and start anew.

On the loose sands of the Ridge section only trees on rough lemon stock should be used. This is a highly debatable subject in other parts of the State but with those of us on the Ridge, the question is very thoroughly settled and we know of no one who would consider a commercial planting on sour stock on typical Ridge soil, unless the ground is near the lake level.

The setting of trees is expedited by means of the following method: Stake the land with stakes one inch square set preferably 25x30 feet. Drive these stakes down about fifteen inches, shovel away a hole deep enough to accommodate the fiber roots, putting the dirt on both sides of the hole. Pull the stake and insert the tap root in the hole at such a depth that the crown roots will be level with the surface of the ground. The tap root being on a prolongation with the trunk, the tree will automatically right itself. With the stake, pack the soil thoroughly about the tap root so the tree will not settle, then carefully place the soil *with the hands* about the fiber roots, being careful to spread them out as they originally grew and to thoroughly pack

the soil as it is placed in the hole. Water well on the day of planting and cover with a heavy dust mulch. Trees thus planted are bound to give good results.

By this time we are led to believe that nearly every member of this Society knows the proper way to cultivate a citrus grove on high pine land; how often to cultivate, when to commence and when to cease. It is a subject frequently discussed and printed over and over again in our horticultural publications. Surely there is no excuse for not being conversant with it, yet a glance at many groves indicates that their owners have failed to observe some of the cardinal points of cultivation, the word cultivation here being confined to the use of tillage tools.

Briefly to summarize the methods then, it may be said that cultivation commences about the first of February with an acme harrow and is repeated every two weeks until the commencement of the rains, after which time trees over four years old are merely hoed while the younger ones are kept free from the voracious Natal grass by cultivating a strip six to eight feet wide along the tree row every two weeks. Once during the summer the cover crop is mowed. This cover crop is theoretically of beggar weed but somehow or other it always turns out to be Natal grass or else the very aggressive maiden cane. Shortly after the close of the rainy season, or surely before February first, all groves are plowed solid to a depth not to exceed four inches, thoroughly disced and acmed.

On account of the fact that Natal grass is on the jump every day in the year it often becomes necessary to harrow before February first, but it will usually be found that a winter warm enough to force the grass will also force the trees and after a tree has once started the withholding of cultivation will not protect it from the cold. One must not regulate his grove work entirely by the calendar or by written rule. When we plead for a standardized citrus industry we do not mean everything should be done by rote—we merely suggest the benefits accruing to the grower when he learns the correct reason for doing as he does and if he applies this knowledge the standardization will be to a great extent automatic. If the industry were thus put upon a business-like basis our northern visitors would cease to comment upon the unkempt condition of many of our groves and the inferior quality of our fruit, shipped when it has "70 per cent of color" and 30 per cent cholera morbus.

This paper is not meant to be an exhaustive treatise on any phase of grove culture—it presupposes a general knowledge of the subject on the part of the audience. The title has been chosen largely in order to emphasize to the grower the necessity of analyzing his business with a view of eliminating inexpedient methods and impractical notions, and it is believed the methods in use on the Ridge demonstrate the present acme of Florida citrus culture, also the great success achieved there is due to the intensive efforts and uniform system of culture.

# Suggestions for Increasing the Consumption of Citrus Fruits

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C. D. Kime, Orlando

It is human nature for us to seize upon a mole-hill, if you will pardon the abuse of the simile, and declare it the "mountain" that bars our path to success and higher prices. But calmer consideration makes us see that it is the multiplicity of "mole-hills" in our way that causes the trouble. One we can label exorbitant freight rates, another production costs, another cost of raw materials and supplies, and yet another lack of advertising to create a demand for our product. All of them are important, all of them big problems but none of them are the insurmountable obstacle we are prone to think them to be.

Florida is no longer a collection of individuals; it is a unity, a State. We are big enough to attack our problems together. And what is more to the point we are so big in this year of 1921 that with the co-operation of the available agencies, there is not one of our problems that cannot be solved. Let us forget, for a few moments, ourselves, the individual, and think in terms of *Florida* the State. Let us attack our problems according to the old fable of the wagoner. This man was driving a very heavy load along a muddy way. At last he came to a part of the road so deep in mud his

wagon mired to the hubs. Every pull of the horses sank it deeper and deeper. So the wagoner threw down his whip and knelt and prayed to "Hercules, the Strong," "O, Hercules, help me in this, my hour of distress." But Hercules appeared to him and said: "Tut, tut, man, don't sprawl there. Get up, put your shoulder to the wheel."

Self help often comes along unexpected channels. I beg leave to submit for your approval and action the following proposition.

## FLORIDA ORANGE WEEK

Let us have a real, big, full sized *orange week*, for the State of Florida.

Let us plan this week to open our winter season of 1921-22.

Let us usher in this week with a proclamation declaring the first annual "orange week" for the State of Florida, said proclamation to be duly signed and sealed by our Governor. Have this proclamation backed up by similar manifestoes from the mayors of all towns within the State. Then let us secure the active co-operation of Chambers of Commerce, commercial bodies, newspapers, Rotarians, business houses, both local and State-wide, county commissioners, the Florida Citrus Exchange, fruit shipping compa-



nies, independent growers and shippers, hotel men, drug stores and soft drink dispensaries, Women's Clubs, schools, railroad development departments, and last but not least, and most important of all, the hearty support of every Floridian. A true Floridian is always with us on any proposition for the good of the State.

#### OBJECT OF ORANGE WEEK

First, to increase our knowledge concerning the use of citrus fruits at home.

Second, to increase the consumption of fruit and juice throughout the whole State during the shipping season.

#### HOW TO ACCOMPLISH THESE OBJECTS

These objects to be accomplished by publicity through the press; by placing of suitably colored advertising posters and designs in store windows, drug stores and fountains, in restaurants, and on sign boards; by using orange designs on letter heads, and special stamps designed to advertise orange uses. These posters should all illustrate the uses of orange juice, orange recipes, and the healthfulness of the juice as a drink. Let each town have an orange festival, with an orange "float" parade, orange week dances, orange week dinners by various organizations and in the private home use the fruit daily.

As the movement grows, and it is bound to grow, let us plan for an orange show week, and usher in the "*king of fruits*," with a pageant, making "orange week," a real event of each year.

#### RESULTS THAT CAN BE ACCOMPLISHED

Let us forecast for a moment what we may expect in the way of results from our efforts. During the winter our northern friends visit with us to enjoy our climate. The population of the larger towns of the State will show an increase of from five to forty thousand. It is not too much to say that for three months out of the year we have an increase of population in Florida of 100,000 people. In the land where fruit is produced by the millions of boxes each season, these potential consumers are actually denied the privilege of drinking orange juice. Good ripe fruit is secured with difficulty. Culls and drops are common. Here where fruit is plentiful these potential advertisers are neglected or are overcharged for a poor quality product.

At our drug stores and soda fountains the fresh juice is rarely to be had. We are neglecting an active demand amounting to thousands of boxes annually, that is already at hand. We are neglecting the development of a greater demand among the thousands that through habit or lack of interest are now drinking the poorer syrup and acid concoctions that have literally taken our market by storm.

We are not alone in this position, as from the pages of the "California Citrograph," we learn that the Fruit Growers Exchange of that State is adopting the "See-It-Made" plan. They have installed electric juice extractors in their experimental stands and instead of selling orange and lemon juice from large glass coolers the new way is to extract the juice from each orange in full view of the customer after he has ordered.

This "See-It-Made" way of serving pure fresh juice is the method they are urging for eastern fountains this year. The work is in charge of a Fresh Fruits Drink Department. It takes by this method only eleven seconds to prepare the fresh drink, brimful of ice and sweetened with pure sugar. The price has been raised from five to ten cents and the size of the glass increased from six to ten ounces. Their reports indicate that business under the new method will be both popular and profitable.

That they are alive to the gravity of the situation in this western State, the following editorial from the California Citrograph will show.

"Orange drinks have appeared by the hundreds since prohibition. Either the public has developed a tremendous thirst for orange colored concoctions or the bottlers think they have. Unfortunately many of the preparations contain no orange juice and are lacking in organic salts and acids and the vitamins which give the great health value to citrus fruits. In most instances they are made of sweetened carbonated water, flavored with oil extracts from orange peel, artificially colored and combined with a base of citric acid. It has recently come to the attention of the Bureau of Chemistry that in some instances mothers, misled by the labels, are feeding these 'fake' orange drinks to infants under the impression they were giving orange juice as recommended by physicians. 'The best way,' says the Literary Digest, 'is to buy the fruit and squeeze out the juice.'"

In California the employees, salesmen and growers are urged to order orange-

ade or lemonade and insist on getting a drink from the fresh fruit. For if you will allow another quotation: "It does not take a majority to establish a preference. Any merchant knows that only a few of his customers specify brands. The others don't specify anything. So he carries the goods preferred by the discriminating few with the assurance that these goods will satisfy the less particular."

The very life of our industry in Florida depends on increased consumption of fruit at a profitable price. Demanding limeades and orangeades is a sure way to increase fruit consumption enormously in our own State.

The California product is advertised tremendously. Every point is stressed and dwelt upon. Its defects are declared to be virtues. Even the thick skin is held up to the buying public as a virtue. Why? Because it will easily peel. California does not hesitate to advertise "Sunkist" orange juice. They push it not only throughout the East but also at home. Yet we all know that the Florida product is without a rival in the quantity and flavor of the juice it contains. The Florida orange is literally bursting with the delicious fluid, so full indeed, that it cannot be cut without overflowing. Drinking the juice is a privilege, an aid to health for the invalid, a tonic for the weak, and a pleasure and delight for the robust and healthy.

In order to forecast more accurately the results of an "orange week" representative soft drink dispensers were visited in person from Tampa to Daytona and down the East Coast. A list of ques-

tions were prepared to which the following is a summary of the answers.

Average price necessary for the pure juice drink in large glasses will be eleven cents with war tax included.

With the exception of those stores having a rush period it is better to extract the juice separately for each order in sight of the consumer.

With two exceptions (one at Tampa and another at Mt. Dora), no attempt has been made to advertise pure juice drinks on an extensive scale. These two stores have had wonderful results.

The demand for so-called orange drinks has been great or small in proportion to the attempt made to push the pure juice. In other words, where the pure drink has been pushed, the demand for artificially prepared stuff has materially lessened and disappeared entirely.

The motor-driven juice extractors have proven very satisfactory in those stands where the rush hour is not heavy and yet of sufficient volume to create a need for a faster method than the glass hand press. The glass hand press has been satisfactory in small towns having good trades but no rush hours of any volume.

In those stands having heavy rush hours, the electric driven extractor seems to be too slow. These places need a reserve supply of juice from which to draw. In the larger towns a delivery service of the fresh juice to such stands may be advisable, though the California result of eleven seconds per glass certainly deserves consideration.

One stand from Tampa reports that they have had wonderful success with the motor-driven extractor, paying for

their machine in less than a month of actual use. Their price for an exceptionally well prepared product is fifteen cents.

While many of the men feel that forty to fifty dollars is too high a price for a machine for juice-extracting purposes, not a one was found who was not deeply interested in the juice business and who was not heartily in favor of pushing increased consumption campaigns.

Sources of fruit supply varied according to locality. This means that in larger towns fluctuations in price are to be expected, depending on distance from packing houses, available groves, etc. One man with a nearby source of supply estimated total cost of drink including overhead, at four and one-half cents per glass.

The method of squeezing juice out in advance and holding same in large glass containers has been tried repeatedly and invariably brought poor results and failure of the attempt in the end.

With the exceptions mentioned above the only attempt to advertise orange drinks have been by local editorials in the press and by the Florida Citrus Exchange. There is no question that these attempts, small as they have been, have brought results.

With one store in a small town, estimating a box and a half daily average for a four-months season, a very conservative estimate will give us a total consumption throughout South Florida of close to 400 cars of fruit, in drinks alone, to say nothing of the advertising value of such work and the additional fruit that will be sold to tourists for home consumption.

The thoughts left with you herein are not new. They have been advanced be-



fore but never with the time as suitable for action as at present. We need these things, this advertising to the winter visitor, this greater interest among our own people. The glory of achievement belongs to "us." Let us then follow the advice of this "Hercules, the Strong," put our united shoulder to this problem and make progress.

"Squeeze out some golden orange juice,  
Stir in some sugar sweet,  
Fill brimming full with fine chipped ice,  
Then drink—'Tis Florida's finest treat."

Dr. Fairchild: I would like to make a suggestion and I would like to preface it with an experience I had during the war trying to popularize dried vegetables. A Californian got into the game of marketing dried vegetables and arrived in Washington with a carload of all kinds of dried vegetables with the idea of having President Wilson start the ball rolling. Somehow or another he got into my office. I said to Mr. H——, "You can't get President Wilson to eat your dried vegetables." The next idea he had was a luncheon to which he would invite the members of the cabinet and others and this luncheon was to be entirely dried vegetables. I had had some experience in trying to popularize some of these things and so I said, "Don't serve more than three kinds anyway." He thought that would be a good idea, but I saw him leaving the office where he had these things stored with an armful of vegetables. That luncheon remains in my memory and will always remain there. I was invited to it as a member of Mr. Hoover's staff,

which was invited as a body. I was particularly interested in dried vegetables because there is such a promising field in dried vegetables. He started off with dried spinach, dried cabbage, dried Brussels sprouts, dried carrots and dried onions on the beefsteak. By this time even the waiters had become much amused over the situation. The people ate these things, but this particular friend of mine on Hoover's staff, a young lady that I was very anxious to get interested in these things, went back and was deathly sick.

Speaking now as a man who comes down here every winter, I am heartily in favor of an orange week. I have never been able to understand why Florida does not challenge California to get competition of this orange business. There is no topic of conversation that is more interesting and more frequent among northern visitors than whether the Florida or California orange is the best. Now, why is it not desirable during your orange week to pick out men whose veracity on this subject is as reliable as members of the Supreme Court, stage it in one of your citrus centers here and challenge California to sell their best citrus fruit to you and have a try out on this citrus business and let the northerner know whether the California or Florida orange is the best orange? You would get a tremendous amount of business out of it if properly handled and, personally speaking, I believe they would go down in defeat.

Mr. ———: Mr. Chairman, I would like to ask Mr. Kime if he anticipates including grapefruit in his orange week?

Mr. Kime: Personally, I am very willing to include them both.

Mr. Sample: I have another suggestion and that is with reference to the speaker's suggestion of 1921 and '22. I would suggest that 1921 be eliminated and make it '22. It is the kind of fruit that is offered the visitors that is killing all the advertising that has been done. The northerner coming down here to eat ripe grapefruit and oranges goes into the stores and gets fruit that would not be offered by a Dago stand in the North and that is why they don't like Florida fruit. Another thing, we don't have fruit available in September for orange week. Now everybody that is an actual grower and not just a commission man who wants big prices will agree with me in this. January or February is the time for a grapefruit or orange week and I would like to see it a combination week.

Mr. Skinner: Undoubtedly this grapefruit problem, as Mr. Sample has mentioned it, is the real thing we are up against, because we are producing it so fast, but I want to relate an incident that has happened this winter in the Hillsborough Hotel in Tampa and in St. Petersburg. There is a professor there who is called a dietitian, who professes to cure certain diseases. He was arrested for using the mails to defraud. At his trial he had as many men as are here present, men of my age and older whom he had surely cured, and the court threw the thing out without ever letting it go to the jury. It came out in the trial that each of these persons, these men and women, mostly men, were using the juice of four grapefruit every day and some

of them lemons in addition. I want to tell you it increased the consumption of grapefruit in the Hillsborough Hotel more than twice over and one of the grocery men told me that he just could not keep grapefruit in his store; they took them out as fast as he could get them in. Yesterday I heard some man make the remark that a physician at Lakeland had written some people that he had been following up the uses of grapefruit juice and that he had found that a grapefruit reduced blood pressure. Now, if grapefruit is advertised to do that and if it does it, we are going to have a big market for it if you will just let the market grow.

Mr. ———: If people threatened with influenza will simply undress and go to bed, abstaining from all food entirely for just two or three days and drink nothing but orange juice, they will be both sustained and cured and go out on the fourth day.

Mr. ———: I think it may be of interest to members of the Society to know that within the past week we have had the first reports of scientific investigations as to the vitamine content of grapefruit. Those of you who read the California-Florida advertisements of citrus fruits know that during the last year or two we have been rather guarded in referring to the vitamine part of the orange. We did it because we did not know very much; even the medical authorities at first themselves were just a little bit leery as to just how far claims could be made in that connection. Different statements were made as to the vitamine value of oranges. You understand, of course, that the claim is that the vitamine

element is the health-giving element of fruit and that has been quite clear to me but it was only by assumption that we could include grapefruit. There had been no definite experiments and we assumed a good deal in making grapefruit embrace the same qualities, trying to word our advertisements so that we could escape what happened to Mr. Skinner's friend. However, some exhaustive experiments have recently been carried on, and, as I remember them, they are almost uniform in showing that the vitamine content of grapefruit in proportion to that of oranges is as 8 to 7, so that apparently we have been quite thoroughly justified in including grapefruit.

Now, Mr. President, if I may include just one word more, whenever there is an effort to increase the demand for Florida citrus fruit and I want to appeal to the members of the Florida Horticultural Society as I have to a large number of commercial bodies in Florida, let us quit boosting California. Every time that we start to talk anything about a movement—this does not apply to citrus only—we hear a lot of talk about the spirited advertising of California as compared to Florida. Now, I yield to no man in my admiration for California, the way she does things and so on, but Los Angeles does not have a thing on Miami and the Florida advertisements for the popularizing of citrus fruits. I want to tell you this, which comes from the official record—the California Growers Exchange and the two next largest operators of fruit and fruit products have absolutely changed their plans of campaign made a year or two ago and have adopted almost in ex-

act detail and substituted therefor a plan that the Florida co-operative growers have consistently followed for the last seven or eight years. I am proud of the fact that they have done that for I think it is one thing that we ought not to fail to consider and that it ought in some degree to cause us to be just a little more proud of Florida and not quite so enthusiastically boost California every time we start to talk advertising. I thank you.

Mr. C. D. Kime: Mr. President, I make a motion that the Florida Horticultural Society go on record as favoring an orange-grapefruit week during the year 1922.

It was moved, seconded and passed that the Florida Horticultural Society go on record as in favor of an orange-grape fruit week.

Mr. J. W. Sample: If I may at this time, I would like to introduce a resolution. A year ago I am informed this Society went on record as indorsing what at that time was known as the "No Fence League." I would like to introduce today this resolution: (Reads resolution.)

I would like also to have a copy of this resolution sent to the Legislature—I should say to a member of each House. I should ask a reindorsement by this Society and the indorsement of this bill. I have not read the bill but if the members of the Society want the bill read I will read it.

Mr. W. J. Krome: I doubt whether there is any member of this Society who individually, personally, more heartily endorses that resolution and the bill than I do but this is a meeting of the Florida State Horticultural Society. Under our



by-laws the meetings of this Society are to be devoted to the discussion of the practical and technical side of horticultural topics only and under our by-laws it is made mandatory upon officers to over-rule any motion or resolution which will tend to permit this Society to participate in partisan politics or mercantile ventures. By that by-law I am obliged to ask the chairman to rule that motion out of order.

C. E. Calkins: Will the gentleman who has just left the floor please demonstrate to me what is more important to me than the destruction of my grove by cattle? I think this matter is perfectly incident to our consideration. (Applause.)

L. B. Skinner: I will have to side with Mr. Krome although I live in a county where the people have cut the fences into

about six inch pieces and are suffering from cattle like my friend over there and a lot of people do that, and while we could vote on that at a mass meeting I doubt as to the wisdom or the advisability of doing it as a Horticultural Society, although I am in favor of it.

H. H. Hume: I know that in committing ourselves one way or the other today we are treading on very thin ice—I happen to be one of those who are in pretty close contact with the Legislature and I would like for Mr. Sample to have gotten his bill through without appealing to the Horticultural Society but I will have to rule against Mr. Krome. Those in favor of adopting resolutions read by Mr. Sample will signify same by the show of the hand. Opposed same sign. Resolution as read by Mr. Sample was passed.

# Some Problems in the Preservation of Citrus Fruit Juices

Seth S. Walker, Tampa

Probably there is not a member of this distinguished Society who does not realize to some extent the importance of the fruit products industry to the citrus growers in particular and to the State at large. It has been freely predicted by those who are in a position to know; that this is the real key to the situation; that the enormous increase in production each year is soon going to out-strip the increase in consumption of fresh fruits and that the only hope of keeping prices up to a profitable figure lies in the withholding from the market of the low grade, off sized, and unattractive article which at present constitutes a large proportion of the fruit shipped. Another, perhaps equally important, factor is the huge amount of drops and packing house culls which now go to the dump, a dead loss. It has been variously estimated that ten to twenty per cent of the entire crop will come under this head. Probably ninety per cent of this wasted fruit, if used at once, is perfectly suitable for manufacture into fruit products. In this connection let me emphasize that "cull" fruits are not as a rule "spoiled" fruits. In fact they are often the sweetest, juiciest fruits in the bins, and are culled out merely because of skin blemishes, thorn

pricks, or other minor defects which render them unfit for shipping long distances.

If the lower grades of fruit now shipped are withheld from the market there will be no difficulty in disposing of the higher grades; and if the dead loss of the cull pile is converted into money, there will be an enormous decrease of the overhead cost per box of fruit marketed, making it actually possible to sell the good fruit at lower prices than are now necessary. Thus the consumer as well as the grower will benefit.

What then shall be done with the low grade fruit? The answer seems easy. "Convert it into fruit products," everybody says in the same breath. But if it were as easy to do as it is to say the future of the citrus growers would loom up bright indeed.

There have been many different attempts made to solve the problem. Some have made marmalades, others jellies, and others candy; some have bottled the juice, and still others have extracted the essential oil from the peel. A number of these endeavors, especially those in connection with marmalade, candy, and juice, have met with a gratifying degree of success, but it is evident to the most casual observ-

er that the citrus fruit product industry in Florida is still in its infancy.

It is not the purpose of this paper to discuss, except in an indirect way, the various reasons why this industry is not better developed. I shall rather confine myself to my subject as it appears on the program and discuss some of the problems which are met in the preservation of citrus fruit juices.

There are several reasons why it is desirable to produce juices, as well as the more usual products such as marmalade and candy. The volume of fruit to be utilized is so great that we need a variety of products in order to get better distribution. The juice is the real, essential meat of the fruit—practically the only constituent for which the fresh fruit is eaten. The bottled juice more nearly resembles the original flavor of the fruit than do any of the other products thus far produced commercially. The juice requires less sugar than do such products as marmalade and candy. There is an enormous demand for all kinds of soft drinks, particularly in these days of desert dryness (of course this argument does not apply to Miami, thanks to its nearness to Bimini!). Not only are soft drinks in demand, but those with citrus fruit flavors are especially popular, as evidenced by the large number of imitations on the market. These considerations leave little room to doubt that there is a real demand for citrus fruit juices.

What, then, are the characteristics of a desirable bottled juice, and what are the difficulties to be overcome in producing it?

It would seem perfectly obvious that the desirable thing is to preserve the juice just as it comes from the fruit with all of its original flavor and appearance, so that the consumer may pour from the bottle the same identical juice that he might squeeze from fresh fruit. This has always been the high ideal of those scientists who have worked with other fruit juices, and it has been the ideal of most of those working with citrus juices. But the difficulties to be overcome are much greater than those encountered with most of the other fruits.

First of all comes the mechanical problem of extracting the juice. With grapes, apples, or berries, the fruit can be chopped up and placed directly in presses, but citrus fruits are built along different lines and have to be handled with more respect. Although there are a few authorities who recommend pressing the whole fruit, most of them agree that it is very desirable if not absolutely necessary to peel the fruit first. If the fruit is not peeled, the juice will contain large amounts of essential oil and of glucoside, which in the case of grapefruit is extremely bitter. A reasonable amount of the essential oil is not objectionable in the fresh squeezed juice, since it adds to the characteristic citrus fruit flavor, but in most cases such juice will, on keeping, develop a decidedly unpleasant "turpentine" flavor due to changes which take place in the oil. It may be possible to work out methods for treating the juice so as to destroy the bitterness and prevent changes in the oil. In that case it would doubtless be much more economical to omit the peeling process.



After the juice is extracted the next step is the clarification, or removal of cell membranes and other suspended solids. Some have attempted to accomplish this by filtration but in most cases have met with small success because the colloidal, gelatinous material contained in the juice immediately clogs up the filtering medium. I know of only one case where the filtration of freshly extracted juice appears to have been successful on a commercial scale. This company is said to have a special secret process which removes not only the suspended solids but also the colloidal matter which is an inherent constituent of the fresh juice.

Other methods of clarification depend on the use of centrifugal machines (something on the order of a cream separator) and in still other cases the juice is allowed to stand until the solids settle out and the clarified juice can be drawn off from the top. A very important point, on which opinions differ widely, is the *degree* of clarification which is most desirable. This point will be referred to again later on.

The clarified juice must next be pasteurized before it is ready for the market. The problem here consists of finding the happy medium between too much heat and not enough heat. And right here let me emphasize that the average person seems to have an absolutely wrong impression of the real problems involved in preserving citrus fruit juices. Most of them think that the main trouble is to prevent alcoholic fermentation, but this is a great mistake. In fact it is really astonishing how little heat is needed to accomplish this, particularly in the case

of grapefruit juice. However, there are other biological factors to contend with, such as mold growths and certain secondary fermentations which produce a very unpleasant taste. On the other hand, if too much heat is used the delicate fresh fruit flavor is injured and a "cooked" taste develops. Another important factor is the time of heating, and so we must find just the right combination of time and temperature and the best way to apply the heat, in order to secure perfect results.

And now we come to the *real* troubles. A good many workers have solved the above mentioned problems in a more or less satisfactory way only to find that the juice was not permanent. After keeping it for some time—anywhere from a few days to several months—the color turns dark, the colloidal solids precipitate out, and, as a rule, a stale, unpleasant flavor develops. This combination of dark color and precipitated solids renders the product unsightly and unsaleable, for it is a well known fact that the sale of such products depends very largely upon their appearance. A few workers, especially in recent years, have met this situation by following the line of least resistance. That is to say they have given up their efforts to produce a cloudy, natural colored juice and are recommending a product from which all of the colloidal solids have been removed and which has more or less darkened in color.

This brings us right down to the heart of the matter—the real point of my paper—which is a discussion of cloudy, natural colored juice versus clear, dark, unnatural juice. Which is the better prod-

uct? And, aside from the question of real merit, which is the more saleable product?

It seems to me that there can be no serious doubt as to the first question. Surely the ideal thing in all such work is to imitate Nature as closely as possible. Nature has made citrus fruit juices cloudy and of certain definite colors, and any product which does not conform to this description is not fresh, natural juice, whatever else it may be. But the trouble goes deeper than that. For, although it does seem that the colloidal material—the material which gives the juice its natural cloudiness—has little to do with the flavor or food value, the darkening of color is nothing more or less than a mild form of decay and is always accompanied by injury to the flavor. If you should cut a fresh grapefruit and then let it stand around until the outer surface darkened ever so little, you would immediately pronounce it “spoiled” and consign it to the garbage can. Why then, should you use any lower standards for judging the bottled juice?

Nevertheless, when it comes to a commercial proposition — particularly the soda fountain business—there is something to be said in favor of a clear, dark juice. The argument is that the general public, not being acquainted with the appearance of genuine fresh squeezed juice, will nine times out of ten choose a dark, clear liquid because of its resemblance to Coca-Cola and other popular drinks. There is no doubt much truth in this, at least so far as the first trial is concerned, but it seems probable that a consumer who could be persuaded to sample both kinds

of juice, would specify the natural colored and flavored product on his repeat orders.

In fact, if a satisfactory product can be made to retain its natural color and cloudiness indefinitely, it would seem to be merely a matter of judicious advertising to educate the public up to an appreciation of its genuineness. It is a very significant thing that some of the largest advertisers of artificial and imitation citrus fruit drinks are laying great stress on the statement that their products are “cloudy like the natural fresh fruit juice.”

Please note that this last paragraph contains a big “if”—“if a satisfactory product can be made to retain its natural color and cloudiness indefinitely.” That’s where the rub comes. Some very creditable products are already on the market and they are getting better with the added knowledge gained from each season’s experience, but I do not believe that even the most sanguine enthusiast would claim that perfection has yet been reached. There is still room for improvement. The laboratory of the Exchange Supply Company is attacking this problem with the purpose of finding out the effect of various factors and conditions on the behavior of the juice, so that eventually we can tell just what combination of conditions is necessary to obtain a given result. We have set for ourselves the ambitious goal of producing a perfect natural juice, “Sealdsweet” in the bottle just as Nature sealed it in the fruit. We are making no predictions of the outcome. Other, more able scientists have given it up and said “it can’t be done.” It is at best a long-time problem, since

it is impossible to tell what a given sample will be like in a year or two years except by keeping it that long to see.

In the meantime we are meeting with considerable discouragement from those who believe that a clear, dark juice is a better commercial proposition than a natural juice. They tell us that our labor is all in vain, since it is a relatively easy matter to produce, the first mentioned product. We are open to conviction on this point and should like to get an expression of opinion from those present as to what our goal should be. We have asked advice from many people but find ourselves almost as badly puzzled as a certain man about whom I have heard. This man had a little too much to drink—and it wasn't grapefruit juice either. He approached a passerby with the query, "Misther, can you tell me where ish the other side of the street?" "Why, of course, you simpleton, it's right over there!" "Ish that so?, the blanked fool over there told me thish was it!"

Dr. Fairchild: I hate to see an opportunity go by to talk about so interesting

a subject as drinks. It is a fact that the manufacturers of beer for generations attempted and in many countries unsuccessfully to get perfectly clear beer. The German beer very seldom kept at a low temperature, a temperature at which it is kept in this country. As I understand it, when the Americans went into the beer business they ran into the difficulty of a low temperature and it took a great deal of experimenting to get rid of that cloudiness. I think you will find it pretty difficult to get uniform cloudiness in drinks.

C. E. Calkins: I may say that we found a better sale for the clear than for the natural but I don't recommend the drink. So many people say that "This is so weak and insipid looking—that is for women and children." The public know nothing about what grapefruit juice looks like—don't want it. That is not the stuff they want to drink and the real point it seems to me in this connection is that juice like this does not lose any of its flavor, but a clear juice without any coloring or cloudiness either, does look insipid, more so than the natural juice it seems to me.



# The Commercial Possibilities of Florida Fruit Products

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Miss A. Webster, State College for Women, Tallahassee

Production without conservation is like a foundation without the house. Since the days of the ancients people have made use of two types of conservation, first that of marketing the fresh product, and second, that of preserving it before placing it on the market. Too often, the Florida grower employs only the first method in disposing of his crop. Statistics show that Florida exported \$80,000,000 worth of food products last year and in return brought back \$70,000,000 worth of these same products, a large per cent of which might have been produced within our own boundaries. And, more surprising than the knowledge that they might have been produced, is the fact that a large part of them were produced, and then allowed to go to waste.

Reliable authority states that sometimes as much as ten per cent of the products delivered to the packing house are discarded as culls. This loss sometimes measures the difference between profitable and unprofitable production. Products known as culls are often so called only because of an external defect that does not injure their value for table or canning purposes. Year after year Florida walks by her own packing houses, where these culls lie, on her way to buy similar products put up in containers in

other states, to distribute to her own people.

A visit to three grocery stores in as many localities in the State revealed the fact that only one Georgia and two Florida firms were represented on the list of some seventy-five different factories whose fruit products found their way into the homes in the State. A visit of this kind is like a tour of America. From Washington with her loganberry fields and apple orchards, down the Pacific to the home of the famous Sunkist fruits, across the Rockies to Chicago, St. Louis and New York, with their factories to which center systems of transportation lined with carriers of fresh fruits and vegetables and from which radiate car loads of containers that find their way into all sections of the country. A closer inspection of these shelves further disclosed the fact that all of the products, with the exception of apples and cherries, could have been put up within our own State.

As unthrifty as the situation looks it is not as bad as it has been. About ten years ago commercial canning in this State developed simultaneously along two lines: the home proposition in which individuals working on a small basis put up a fancy product for a fancy price; and

the factory proposition operating on a larger basis put up a commercial product to compete with similar products on the world's market. The introduction of Home Demonstration work into the State in 1912 gave this industry tremendous impetus. During the intervening years there are many instances where exhibits of products made in the home have stimulated the commercial work on both a large and small scale.

A few of the many worthy examples of production for fancy trade from the home kitchen in one season, is the work of such people as:

Mrs. J. J. Willie, Lloyd, Florida, 2,000 containers of figs.

W. H. Haskins, Winter Haven, Florida, 25 gallons of guava jelly.

Mrs. Ballentine, Ft. Myers, Florida, 2,000 glasses of guava jelly; 1,000 glasses of Cattley guava jelly.

Mrs. Barfield, Caxambus, Florida, 2,000 No. 3 cans of guavas; 100 No. 2 cans of mangos; 200 gallons of roselle juice; 2,000 glasses of guava jelly; 1,000 12-ounce jars of orange jelly.

Mrs. Hess, Ft. Myers, Florida, 200 12-ounce jars of kumquats; 400 lbs. of crystallized peel.

Calls constantly come to the Home Demonstration Agents and the Home Demonstration office at Tallahassee for the Florida State College Bulletin No. 34 on Jellies, Preserves and Marmalades. This bulletin has not only gone throughout our own State, but also into every State in the Union. "If a penny saved be a penny earned," then the filling of the home pantry by the girls and housewives is but another method of marketing Flor-

ida products at home. Since the fall of 1918, through home demonstration work there has been reported 3,197,188 containers filled with fruits and vegetables.

Although citrus fruits rank first in point of production they are but one of the many varieties that can be grown. In addition to the citrus, chief among those that lend themselves readily to commercial canning are the guavas, roselle or Florida cranberry, mangos, strawberries and others that grow in abundance throughout the middle and southern sections of Florida, while in the northern section of the State we find figs, muscadine grapes and uncultivated blackberries growing in abundance. There are many others with promising possibilities, but these are grown at present in sufficient quantity to be utilized for commercial purposes. No less interesting in number and variety are the products to be made from these fruits, some of which are, preserves, jams, jellies, marmalades, chutneys, juices, vinegars, pickles and confections. Plans are now under way for the development of a muscadine vineyard in North Florida with an idea of placing grape products on the market.

The demand within our State for soft drinks, such as pepsi-cola, cheri-cola, coca-cola and many other of similar nature is sufficient to pay a yearly revenue of approximately \$3,503,210.88, according to figures obtained from the Internal Revenue Director of the State. Commercial production of the wholesome juice of the muscadine grape and various citrus fruits would in all probability find not only a welcome, but also a ready demand from the public. The juice of the musca-

dine grape which is a native of the State need only to be known to make a place for itself on the market. A satisfactory method of putting up this product has been developed by Mr. Chas. Dearing of the United States Department of Agriculture.

The manufacture of satisfactory citrus products has been only partly solved, but the possibilities seem so great that, in spite of discouraging failures and par-

tial successes the problem claims the time and thought of scientists and manufacturers. The fact that in other sections of the country the commercial production of other fruit products has long since passed the experimental stage indicates that this industry backed by the required capital, necessary training and perseverance can be entered upon with a minimum chance of failure.



# Bordeaux-Oil Emulsion Spray

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J. R. Winston and W. W. Yothers, U. S. Department of Agriculture,  
Orlando, Florida

Bordeaux mixture, one of the standard spray compounds, is generally conceded to be the most effective all-round spray that has been devised for the control of plant diseases. Co-existing with its desirable qualities there are several undesirable features and for this reason numerous substitute materials have been exploited or otherwise introduced from time to time.

The experienced fruit growers of Florida are too well acquainted with the various sprays to need a discussion of the several types, especially their limitation, but for those who have taken up citrus growing more recently a few words of explanation may be justified.

In general, the copper sprays, such as Bordeaux, Burgundy, and ammoniacal copper carbonate mixtures possess fungicidal properties of considerable potency which kill beneficial fungi or those which cause insect diseases as well as those causing plant diseases. They possess no material insecticidal values, consequently scale insects increase rapidly after such sprays are applied, unless proper insecticides are used following these applications. This is especially true where Bordeaux mixture is used for this material

is effective over a considerable length of time.

Sulphur sprays, for example, lime-sulphur, soda-sulphur, and barium-sulphur solutions, possess both fungicidal and insecticidal properties to a fair degree. They are much less effective against fungi in general than copper sprays. The reaction of the sulphur compounds on fungi is milder than copper sprays and operate over a much shorter length of time. On the other hand, these sulphur compounds kill young scale insects and therefore these pests do not increase very rapidly following the application of such sprays.

Because of the very serious scale infestation which is almost sure to follow applications of copper sprays, most fruit growers select the sulphur compounds as a means of controlling citrus diseases. However, conditions for severe infection frequently arise which warrant the use of Bordeaux mixture. Heretofore, when such was the case, several additional applications of oil emulsion were necessary in order to reduce the scale infestation to a normal level, thereby adding no small amount to the annual cost of spray materials and their application. Aside from the scale and white fly increase, rust mites are known to become more abun-

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dant and the injury resulting from them more pronounced following applications of Bordeaux mixture than is the case where no sprays are used.

With this information at hand it was deemed advisable to determine whether or not Bordeaux mixture could be combined successfully with the present day oil emulsions and applied without injury on citrus trees and fruits at various stages of growth. Accordingly, a series of laboratory tests were commenced during the early fall of 1917 with the view of combining these two sprays. It was found that any dilution of the various oil emulsions combined readily with any strength of Bordeaux likely to be used and showed no detrimental effects upon either the Bordeaux mixture or oil emulsion. The first field test of this combination spray was made during the late fall of 1917 on a large bearing citrus grove near Orlando, Florida.

The Bordeaux mixture was prepared in the usual manner, using three pounds of bluestone and four pounds of lime for each fifty gallons, and the oil emulsion was added afterwards to the spray solution with the agitator running. Both "cold stirred" (1) and "boiled" (1) emulsions were used, each in quantities that would give one-half per cent and one per cent of oil in the diluted material. Three applications were made at intervals of two weeks.

(1) Farmer's Bulletin 933, U. S. Department of Agriculture, Washington, D. C. "Spraying for the Control of Insects and Mites Attacking Citrus Trees in Florida."

During the scab spraying seasons of 1918 and 1919 this combination spray

was given rather thorough trials in bearing groves at various points in the State. During the execution of this work trees were sprayed at all stages of growth; on the tender flush, in the bloom and at intervals thereafter, but no one grove was sprayed more than three times with this Bordeaux-oil emulsion combination. Both the "cold stirred" and "boiled" emulsions were used in these tests.

In addition to these a more critical test was made in the experimental nursery at Orlando on seedling grapefruit, rough lemon, and sour orange nursery stock. A part of this nursery was sprayed with 3-4-50 Bordeaux mixture and another part with Bordeaux oil emulsion (3-4-50 Bordeaux plus one-half per cent oil emulsion.) The applications were made at weekly intervals beginning in March and ending in October, 1919. Usually the ordinary "boiled" emulsion was used, but occasionally the proprietary emulsions, such as Schnarr's Spray Formula" and "Fico 60" were substituted. All of these emulsions served equally well.

Again in 1920 extensive experiments to prevent citrus scab were carried on in several sections of the State. Tests were conducted on both nursery trees and bearing groves. At Orlando a nursery consisting of sour orange, rough lemon, and grapefruit seedlings was sprayed twice a month from April until October with various strengths of Bordeaux combined with emulsion at the rate of one-half per cent oil in the diluted material. The sulphur sprays, such as Dry Lime Sulphur, Barium Tetra Sulphide, and Lime Sulphur Solution, used on the basis of equal

amounts of sulphur in the diluted spray, were used along with the Bordeaux for comparison. Bearing trees were sprayed with 3-3-50 Bordeaux and one half per cent oil emulsion at intervals of one, two and four weeks during the scab and melanose season. Both deep well and lake water were used in the spraying. At Orlando and vicinity extensive experiments were carried on for the prevention of melanose and stem-end rot.

While this work was in progress certain rather interesting and important observations were made which may be summarized as follows:

All brands of commercial oil emulsions and miscible oils tested by us, and the government formulae "cold stirred" and "boiled" emulsions were found to combine readily with Bordeaux mixture.

Bordeaux-oil emulsion settled less rapidly and spread more evenly than plain Bordeaux.

Bordeaux-oil emulsion adhered to the sprayed parts as well or better than plain Bordeaux. (2.)

(2) Department Bulletin 785, U. S. Department of Agriculture, Washington, D. C. "The Field Testing of Copper-Spray Coatings."

This combination was successfully made with shallow well and lake waters and with various types of untreated deep well waters except on two properties where slight injuries to tender foliage followed the failure to secure a perfect mixture. Even plain Bordeaux gave injurious results on these properties. These failures were undoubtedly due to unusual chemicals in the water.

The presence of the oil neither increased nor decreased the effectiveness of Bordeaux against citrus scab. This combination spray was very effective against melanose and indications are that it can be used with success against stem-end rot.

The presence of the Bordeaux neither increased nor decreased the effectiveness of the oil against the various species of white flies and scale insects present.

The critical time for the application of the plain oil emulsion following the combination is during the last week in June when the second generation of purple scale have just hatched and are therefore more easily killed.

More than 50,000 gallons of this combination have been applied on fruit, twigs, and foliage of all commercial varieties, at all stages of growth, including the full bloom period, during all weather conditions which permit of spraying operations, and no spray injury was observed on trees receiving the normal number of applications except as noted above. Where the bloom spray was applied, oil emulsion was used at the rate of one-half per cent oil in diluted spray. At all other times the emulsion was used at the rate of one per cent oil in the spray which is the regular strength for scales and white flies. It thus appears that oil emulsion combined with Bordeaux mixture has less tendency to injure tender growth than oil emulsion alone.

Rust mites became much more abundant on trees sprayed with Bordeaux than on unsprayed trees. There was no appreciable difference in the number of rust mites following applications of Bordeaux and following applications of Bor-



deaux-oil emulsion. However, the maximum infestation was reached from two to three weeks earlier than on unsprayed trees.

Scale insects became very abundant and did considerable damage following applications of plain Bordeaux. They became less abundant and did far less damage where the Bordeaux is combined with oil emulsion at the rate of one-half per cent, or one-half the strength usually used against scale insects and white fly. Where Bordeaux was combined with one per cent oil emulsion, followed by a straight oil emulsion spray, scale insects did not increase more rapidly than on unsprayed trees, but became somewhat more numerous than where lime-sulphur was used, at the usual dilutions for controlling fungus diseases.

Bordeaux-oil emulsion spray should never be expected to take the place of the oil emulsion spraying for white fly and scale during May and June and should always be followed by at least a single application of the latter.

Most of the commercial Bordeaux pastes and powders will give satisfactory results if used according to their copper content basis, and can be mixed with the various oil emulsions. Some of them, however, will not mix with the oil emulsion without being treated. This objection can be overcome by the addition of a small amount of lime after the Bordeaux has been dissolved and put in the spray tank. *Severe injury has been reported following the use of a commercial substitute for Bordeaux-oil emulsion. On investigation it was found that the article was in no sense a Bordeaux-oil emul-*

*sion combination and should never have been used as such.*

The results to date of tests with the Bordeaux-oil emulsion mixture have been highly satisfactory and indicate that it will prove very effective in the control of certain fungus diseases of citrus and that its use is not followed by injury to the trees or fruit or by abnormal increase of scale insects such as follows plain Bordeaux. While it may be too soon to make definite recommendations of it for extensive grove treatments, it seems proper at this time to inform growers on the subject and suggest the desirability of their trying it out in a limited way in this season's spraying. Since plain Bordeaux must be followed by an application of oil emulsion and since the combination of Bordeaux and oil emulsion is equally effective as when these sprays are applied separately, there is no apparent reason why they should not be applied in combination, thereby reducing the cost of spraying operations. To this end the writers will be glad to give through correspondence any further details that may be required by any individual.

W. W. Yothers (after reading paper): I should say that this matter of spraying with Bordeaux-oil emulsion combination is, in my opinion, beyond all question the most serious one that confronts any orchardist who practices spraying. There seems to be no other way of controlling some citrus diseases except by Bordeaux and when you put Bordeaux on the trees then you practically eliminate the benefit which the grower receives from beneficial fungi. This then places the entire control of both diseases and insects on an

artificial basis and that is the real reason that we desire that the horticulturists of Florida should help us out in this matter. We want the growers to use the material three or four times and find out what results they get and see how they like it. Now, Mr. Nichols of Clearwater will follow me with a paper and I am very glad to know that he has a paper and will give you his experiences as a grower and I should say here that I admire Mr. Nichols very much; I think he is one of our very finest growers.

Mr. Hume: Is there any discussion of Mr. Yothers' paper? Any question?

Mr. Skinner: I wish to say that we sprayed with Bordeaux-oil as Mr. Winston and Mr. Yothers have suggested and in one portion of our grove where we had had much stem end rot, during the following year we had much less, hardly any for that matter, and we felt that the Bordeaux-oil did a great deal of good. We felt sure of it at all times but my experience does not prove anything. I want to ask Mr. Yothers how many times a year and at what times he would recommend using Bordeaux-oil spray.

Mr. Yothers: I suppose it is a very

fortunate thing that I am not a pathologist, but last year Mr. Winston kept track of melanose by going out in the groves pretty nearly every week and I was very, very much pleased over the result that we obtained with one spraying with Bordeaux-oil emulsion for melanose. He seemed to know almost exactly the day and the week to spray for melanose and by applying it at that particular time I believe that was enough for melanose.

Mr. Skinner: Would you recommend the oil-Bordeaux spray for the last of April or just an oil spray?

Mr. Yothers: I think we sprayed for melanose as late as the last of May. One thing certain to remember: Anybody who puts Bordeaux on their trees in any shape will practically be compelled to spray the last week in June for scale and I would not wait until the last week in July for it is a critical time in June. I regret that Mr. Winston is not here for really he is a very, very brilliant, highly trained technical man and he has an enormous amount of information about this.

Mr. ———: Will Lime Sulphur Solution mix with Bordeaux?

Mr. Yothers: No.

# The Spraying of Citrus Trees

A. C. Nichols, Clearwater

This title might lead you to think that I was going to tell you all about this subject. But actually all I have planned is to tell you how I handle the subject on my own grove, with no intention of offering advice to these experienced growers.

When I first began to spray, and this was when I first owned a grove, I started out with one of these man-power lever 2-plunger pumps rigged up to a 50-gallon barrel and as an absolute novice, since I had never even seen any spraying done. The only reason I can see now for success with such inexperience and inadequate outfit was the surprise on the part of the insects on these heretofore unsprayed trees. I call this outfit inadequate for, while it would handle two nozzles, it was only at a pressure of 80 to 100 pounds, and because of its inability to get over any job at all sizeable and get it done quickly. My only excuse for its use was lack of cash to get anything more expensive. My next effort was to hire power machines. This proved generally unsatisfactory because there were few machines available, they were difficult to get just when wanted and often the work of the operators did not suit me. Then I got a used machine myself but it was of small capacity and I finally graduated some two years ago to a new, large machine having a triplex pump ca-

pable of handling four nozzles or two guns at 250 pounds pressure. Since then we have been able to get out and get a job done with certainty and dispatch.

But no matter what machine a man uses, I believe one of the most potent factors for results from spraying is in thorough work. I have seen a mist drifted around and through a tree which was called spraying. I think a better term for it would be a waste of money, for such work can not be expected to produce results. In my own grove, though we try to spray thoroughly, I have seen where some bunches of oranges were missed by an operator in a lime-sulphur spraying for rust, and this fruit continue to rust right on in spite of the known killing power of the fumes as well as of contact. Then what effective control can be expected of careless spraying, say with the emulsions, where only actual contact kills? In our own grove we first get inside of the trees and thoroughly spray there, then take the outside beginning on the side away from the machine and, if using rods, thoroughly working the nozzles in and out amongst the foliage. We generally go back inside the tree a second time on the opposite side in order to thoroughly cover. We normally spray under 225 pounds pressure. For the emulsions, at the beginning of each



spraying, I take it slow and send the men back repeatedly to see for themselves whether or not they are actually getting the under sides of all leaves. As to whether we use rods or guns depends upon the trees and what we are spraying for. We always use guns on seedlings and always for lime-sulphur sprayings on all trees but for the oil sprayings on budded trees I believe rods with angle nozzles give us more thorough results. On rust sprayings we are not quite so careful when covering the insides of the trees, but for our spring 1 to 40 lime-sulphur application on grapefruit we try to be as thorough inside as out, for only in this way can we get the fruit covered when the new growth hides and shields so much of the new fruit from outside work. As to the amount of liquid used I believe we cover a trifle more ground with guns when trying to do equally thorough work.

Now as to *when* to spray, we have the spray schedule admirably worked out for us by the several men and agencies that are helping us growers in the State. If completely followed, I have no doubt it will accomplish its purpose, that of giving us high-grade fruit, and more of it, from clean trees. But, for my part, while I follow the schedule in a general way, I try to exercise some judgment in its application to my own grove just as I suppose the rest of you do. For instance, I very seldom make any spraying in the bloom but follow it immediately with a lime-sulphur application, on both oranges and grapefruit. On grapefruit I use lime-sulphur solution 1 to 40 irrespective of weather conditions or whether I have

noted any scab on young growth. I do this because this preceding by only two or three weeks a spraying that would be necessary for red spider or rust mites or both, makes that unnecessary and the extra two gallons of lime-sulphur per tank is used as insurance against scab, should scab weather develop. (1.)

(1) Sometimes, by making only this one spraying, I do get some scab showing up on the young fruit, but it does not seem to develop and the fruit outgrows it. Of course, if serious scab infection should begin to show upon new growth, I should probably get out and spray in the bloom.

The application of lime-sulphur solution on oranges at this time is 1 to 66. As to the reasons for making this application at this time instead of waiting until there are spiders or mites to justify it, can only say I would rather do it when convenient than to drop everything else as a matter of necessity; that I would prefer to have no indication of spider at all; and as I believe lime-sulphur solution aids early maturity of fruit, I like to begin as early as possible. I also think it acts as a tree tonic and hence if applied at this time may cause a bit more fruit to stick. This one lime-sulphur spraying, thoroughly done, holds down rust generally until the first part of July and in only one season that I can remember has any further spraying for rust mites been necessary. I have tried to reconcile the statements I have heard at times that for effective rust mite control a spraying is necessary every six weeks with my own experience that two sprayings are ample, and the only answer I have been able to reach is that perhaps we spray more

thoroughly when we do spray than do others who spray oftener. (2.)

(2) Soluble sulphur I seldom use unless I happen to need a sulphur spray at the same time as an oil spray and this does not prove often. In my own experience it does not begin to be as effective in the control of rust mites as is lime-sulphur solution.

I invariably make the oil spraying in the fall, although if feasible I like to wait until the fruit is picked. Of course, if the fruit is badly sooted an earlier spraying is necessary. The spring application depends upon my need. I have been at outs with the spring application, especially on grapefruit, because I have generally gotten oil spotting or shadowing of the fruit and sometimes permanent injury in the form of burns. I have tried different insecticides but with no different results in this respect. Often, when just the right time comes to spray for white-fly, the fruit is pretty small, and these considerations have led me to omit the May spraying unless fly or scale is prevalent enough to make its application imperative. This past year, however, the use of a very weak Bordeaux in the oil spray, and in hard water, that is, at the rate of not over one-half pound of bluestone and lime each, to fifty gallons of water enabled me to make this spraying without producing so much as one oil spot on the fruit that I could discover. And I am perfectly satisfied that the result was due to the addition of the Bordeaux, for in a neighbor's grove where our equipment was used, the same oil emulsion in *soft* water but without the Bordeaux produced very considerable oil shadowing.

Now sometimes things come up that are not mentioned in the schedule. For instance, some three years ago I had a very bad infestation of Mealy Bug on grapefruit. Wishing to do something, but not knowing what, I sprayed experimentally with lime-sulphur and Black Leaf 40, lime-sulphur and nicotine, whale oil soap and nicotine, and with a proprietary insecticide. While all of these combinations appeared to have some effect on the old bugs, shortly afterwards there were great numbers of crawlers so that I was satisfied that my spraying had been ineffective. Yet, in three to four weeks, all of this infestation appeared to be dead. But I never gave spraying any credit for it and learned later that doubtless fungi that attack the Mealy Bug had overtaken and conquered the bugs at last.

Again, when experimenting last year with the Bordeaux-oil combination spray, I sprayed two rows through the seedling grove with it. The seedlings had shown serious ammoniation on the previous crop and in the fall of 1919 I had dosed the trees with twenty pounds of ashes and three pounds of Bluestone each. On the 1920 crop a little ammoniation showed up in July, a little of the young fruit split and fell off and that was the end of it. But on the two rows sprayed with the Bordeaux-oil, although through one of the worst ammoniated sections, no ammoniation showed up whatever at any time. A similar result was obtained on a few pineapple trees where the fruit had previously persistently shown some little ammoniation in spite of applications of bluestone and of ashes.



While mentioning this as one very definite and favorable result from the use of this combination spray, my principal use of it was on grapefruit. Here I did not obtain the results I had hoped for and I have been rather hesitant about discussing them here. But I realize that the trouble might just as easily have been with myself as operator, and probably was, as with the material. And I decided that if you will understand that what I say is not at all intended as any criticism of the spray but simply for discussion, I would tell you what I did. It was used first as a clean-up spray on a block of trees six years of age, before the spring growth came out and also on a few rows in the larger grove. We had a very long blooming season last year and my follow-up spray with lime-sulphur solution 1 to 40 was not put on until April when finally all the bloom had shed. Up until April comparatively little scab infection was noted but just shortly after the April spraying there seemed to be considerable infection on the fruit. There seemed to be no difference, however, where the Bordeaux-oil had been used previously. Later, in June, I saw a few indications of Melanose and it occurred to me that this spray might protect the most of the crop from infection during the summer rains. So I put it on all grapefruit excepting about fifteen trees. This one spraying, but on some parts two if the clean-up spray is counted, did not prevent Melanose (perhaps I should have used more or infection may already have taken place), and the fruit on the unsprayed fifteen trees was certainly just as good as that on the other trees. So,

because of the lack of results as I used it, the heavy dose of scale that followed on these trees, and of its cost, of which I will speak in a moment, I am not, at present at least, in favor of its further use on my grove.

As to cost, I figure the Bordeaux-oil spray cost me about one and three-fourths cents for material and one cent for application for each gallon of spray used. It took on an average ten gallons per tree or a cost for a single spraying of twenty-seven cents per tree. As these trees picked on an average just under six boxes to the tree—they had just a good average crop—it gives a cost per box of four and one-half cents. It seems to me that if many sprayings are necessary for results that my need would have to be very serious—much more so than it has ever been yet—to justify the expense. They would practically be entirely additional to the regular four sprayings and which I figure, at present prices, at about twelve to fourteen cents per box total. I might add that, except for some Melanose, these normal four sprayings give me reasonably clean trees and crops of bright desirable fruit.

Another thing I might speak of in this connection, although it has no relation to the efficiency of the material. The Bordeaux-oil was used in June and of course in July I had to use lime-sulphur for rust. The combination of these two sprays produced a brilliant reddish brown spotting on leaves and fruit. This gradually weathered to a black and persisted on the fruit until picking. I had to explain to every prospective buyer what it was and show how easily it rubbed off, for it



made the fruit appear as though it needed explanation or apology. Actually too, in the early stages of coloring, these spots hindered the coloring of the skin directly beneath so that when rubbed off the skin showed a mottled green and yellow.

# Gummosis and Frenching

Eugene L. Pearce, Clearwater

This is not a scientific paper. I shall mention no measurement finer than the thousandth part of an inch; no time limit shorter than the hundredth part of a second. I shall not differentiate sharply between a fungus, a female bacteria and a group of pupae.

This paper will represent some part of the experience of a plain grower. I trust it will possess one quality worth while—brevity.

And now to business:

Gummosis is a serious matter, when neglected. If noted when tree is first attacked, it is one of the least difficult of citrus disorders to check. Whenever the grower sees gum breaking from the bark of a grapefruit tree or a tangerine—in my section it is chiefly these varieties of the citrus which are attacked—diagnose the trouble as Gummosis and go to work. Should the trouble prove not to be Gummosis, you have ordinarily done no particular harm. If the gumming is caused by Gummosis, you have bettered the situation.

In the above advice, the writer is assuming that Citrus Canker has been virtually eradicated in Florida and that Psorosis has not yet been listed as an incurable disease.

The treatment for Gummosis is simple. Cut out all bark which seems to be af-

fectected by the disease, until bark is clear white where cut. The same rule applies to the sap surface beneath the bark. Scrape it until the wood is white and free of all discoloration, especially of those raised, pulpy spots which seem to be the seats of infection. Examine the tree carefully, the trunk and the limbs, for other evidence of the disease. Treat all gumming, even the slightest, as prescribed.

Three or four days after these surgical operations, when sappy surface is entirely dry, paint all bared surfaces with Bordeaux paste or protexol (*Avenarius carbolineum*). In rather young trees it is safest to dilute the protexol to half its pure strength by adding whaleoil soap and water. Every grower knows of this treatment. The only element in it which has never been sufficiently emphasized is prompt action. The work is trifling, if done in time. Vigilance and immediate treatment are the chief ingredients in the remedy.

While the "stitch in time" adage is the secret which usually marks the difference between the man who grows oranges for a profit and the man who grows them to look at, with Gummosis, let me repeat, prompt attention is the all-essential.

After such a treatment, inspect the trees attacked at intervals for a recur-

rence of the disease. Nip a recurrence at once. Should you fail to inspect your trees frequently and systematically, or should you neglect to treat them promptly when trouble is found, Gummosis will often become so firmly established, from lower trunk to upper branch and throughout the entire life-system of the tree, that it becomes impossible to check its work of destruction.

Gummosis seems to be a fungous disease, but as this paper is merely in the nature of a few practical suggestions from one grower to other growers, I am only interested in effects and treatment and not in cause or causes. From my personal experience I should say Gummosis is contagious. Where a tree affected by Gummosis is not promptly treated, other trees in the vicinity will often contract the disease. It is recommended that a cloth be spread around the trunk of a tree about to receive treatment and that all bark and scrapings be gathered up carefully and burned.

A new and more deadly form of Gummosis in all probability must be added to the enemies of the citrus—the disease identified as Psorosis.

The writer has recently lost two vigorous young seedling grapefruit, about twelve years old. One of these trees, in the judgment of several expert observers, was killed by lightning. Tops of other trees close by were slightly affected. The bark about the tree from the crown to a distance of two feet above the ground was entirely dead.

The second tree at first showed no sign of wilting, but the bark about the crown was without life and had much the ap-

pearance of the tree described. It was entirely girdled, but there seemed to be no gumming on trunk or limbs. Trees in the vicinity did not appear to be affected in the least.

Reasoning from the angle of elimination, the tree in question did not seem to be affected by Blight, nor would the usual lightning tests apply. It did not have the appearance of Mal-di-goma. Also the seedling grapefruit is not subject to Mal-di-goma unless strongly exposed by contagious contact, which was not the condition in this case.

It may be that this new manifestation is a physiological disease. Certainly it seems to have the stealthy, deadly action of Blight, but as a preliminary the bark was killed above the crown. The tree was entirely girdled.

There is always the possibility, in the instance cited, of a single-track lightning stroke—somewhat like our ex-President's mind—one of those strokes which had some place in particular to go and went right there.

#### FRENCHING

Under this head the practical grower is interested in cause, for Frenching in many cases is the result of an overt act by the grower.

Frenching may be caused by any of a number of conditions unfavorable to the health of the citrus. Green vegetation in quantity, plowed under in the summer or early fall, inducing fermentation and greatly increasing the humic acid condition of the soil, will bring about Frenching.

Dead leaves or grass in quantity buried close about a tree will cause the same



condition. I know, for this was a personal experiment.

Deep plowing, thereby breaking more roots than the trees can afford to lose when carrying a heavy top, will sometimes produce Frenching. The working balance between root and branch is often upset by such a practice.

Removing the cover crop from a grove, for any purpose, or failing to grow such a crop once a year, until the humus becomes insufficient, will result in depleted vitality and bring on an attack of Frenching in connection with Melanose and other diseases which are always associated with trees whose reserve of strength is at low ebb.

In building up quickly and renewing the soil bacteria, use organic manures as well as chemical sources of food.

Land not properly drained will cause Frenching and in unusually wet times great and permanent damage to the trees.

Remedy: Avoid the bad practices and experiments suggested above. An orange grove is not a plaything. It is a business, and one that has its problems. There are losses sufficient and unavoidable without courting new trouble. When in doubt, consult the Experiment Station. Let the State of Florida pay for the mistakes which you hanker to make yourself.

# Observations of Diseases and Insect Pests of Citrus

C. W. Lyons, Tampa

My observations have been confined more to foot-rot and gummosis than to other diseases. I have, however, found a great amount of withertip in old seedling trees and also in budded trees.

*Withertip.* It is important to cut back trees affected by withertip. I had occasion two years ago to visit a grove where I recommended that *two* trees affected with this disease be cut back. This was not done, and now there are about thirty-five trees affected, which will have to be cut back practically to the trunk to save them. This quite clearly demonstrates the importance of pruning and above everything else, burning the limbs cut from these trees.

*Foot-rot.* I have encountered this disease frequently among the old seedling trees, and the greatest benefits which have been derived from treatment have been accomplished by removing the dirt from the base of the tree, back about twenty-four inches, and down under the crown roots, allowing the air and sunlight to penetrate. I have seen more good results from the air and sunlight cure than from any other method. A great many growers use some good disinfectant. However, if the tree is badly affected there is no use treating the roots and allowing the dead and sick wood to remain in the top of the trees. I have seen this

tried, and it has proven a failure for the reason that you cannot expect live sap to circulate through half dead wood.

*Sourness.* Another disease that goes hand in hand with foot-rot is that of sourness, which is caused from the fermentation of leaves and trash, etc., which are allowed to accumulate and remain in the forks of old budded and seedling trees. If the hollows in the trunks of these trees are not taken care of, it is only a question of time until there will be no trees. I observed one grove where this rubbish or solid matter was removed with a small garden trowel, and a hole bored in the trunk of each tree, at the bottom of the cavity, thereby allowing the water to drain out. This treatment benefited the trees greatly, and in the same grove where there were trees that were not treated, a great many limbs were either blown off or fell down from being badly decayed. This is really a first aid method that costs very little, but naturally the cost of treating a great many trees in a large grove has to be given some consideration. It should not be necessary to have a special man brought in to do this work, as it is very simple, and the grower should have very little trouble in doing it himself. Some growers may contend that this is only a makeshift and would not be a permanent cure for the tree, but from ob-

servation and experience I find it necessary to keep up the work to hold trees of this character in good condition, and keep them from going back.

*Gummosis.* I have seen some very bad cases of this disease on both young budded trees and old seedlings. I saw one old grove in particular that was run down, and work was commenced in this grove by giving a very liberal application of fertilizer, and in addition there was applied about five pounds of nitrate soda to each tree. During the period, to use a common expression, I might say that the grove was almost "cultivated to death," and was followed by a very bad case of gummosis. The following recommendations were carried out: Cultivation was entirely stopped for a period of seven months, and the wounded places on each tree treated with crude carbolic acid and soapy water, the mixture being made of equal parts. This was applied at least three times to the affected parts, and the results of this method have proved to be very beneficial, and the grove is now in what might be called normal condition.

*The Hoeing of Trees, Especially Young Trees.* Hoeing trees, especially young trees, is very important. It lessens the chance of insects accumulating and doing harm. Great care should be taken to remove the banks from about the trees, and to see that the entire amount of dirt is taken away from the trunk of the trees down level with the crown roots. Any rubbish, dead wood, etc., which may have accumulated against the banks should be picked up for the reason that it lessens the accumulation of ants.

#### A FEW DON'T'S

Don't give your trees an unusual application of spray material when you are spraying, especially of the oil emulsion, and particularly when the trees are in bloom, as it will burn young growth.

Don't dig a trench around your trees and put bluestone in it and then pour water in the trench thinking you will give your trees a good application, and direct to the spot. This may kill your tree. I have seen this very thing happen twice. If you have occasion to put bluestone into the tree, do not use more than two small pieces, about the size of a pea, as this amount will inoculate them, and probably give you the desired results. I came across one grower who had given them what he called "a good dose" and now he has no trees.

Don't paint the trunks of trees with oil insecticides to get rid of lichens without first diluting it. I saw some fine old trees absolutely killed by this method.

Don't cut a ditch down the middles to the extent of two feet, to drain the land, and especially when trees are in bloom, as this may cause them to shed their bloom. One grower attributes the cutting of these roots to this ditching, and I know of one grove where the trees were thick with bloom and the trees put on practically no fruit last year.

Don't spray with a strong solution of Bluestone to cure *dieback*. I have seen this tried, and it defoliated the trees.

Don't put Bluestone under the branches close up around the trunk of the trees; also don't apply Bluestone during the rainy period.



Don't fill up holes in old seedling trees with cement, without first having all the old dead and rotten wood taken out, for the reason that the cement will do absolutely no good. Dry rot will set in and you can accomplish nothing whatever, by simply putting a cover over the hole, while the real damage is being done underneath by decay on the inside. I have seen several groves where this cement work on trees has been proven a failure for the reason that from the surface everything looked good and sound, but decay was fast rotting away the inside of the tree. I believe that the best method that I have seen has been to chisel or cut out all the affected parts and leave them exposed to the air and sunlight.

Hume: Is there any discussion of this paper at this time? I would like to appoint two committees at this time, first, the Committee on Final Resolutions—Messrs. Edgar A. Wright, R. L. Goodwin and S. F. Poole, and an Auditing Committee to consist of M. G. Campbell, J. G. Grossenbacher and G. W. Peterkin. Before going on with this morning's program, Dr. Mark Sample has a matter which he wishes to present to the Society and I will give him an opportunity to do so at this time.

Dr. Mark Sample: A number of months ago we growers of Polk County from Haines City to Sebring assembled together as the Association of Boards of Trade, and talked over a matter which finally resulted in a committee of three being appointed to draft a bill to be known as "Pest Control Act," which we hoped to have passed in this Legislature. A number of years ago a bill very simi-

lar to this was started but when the Plant Board learned that the functioning of this law if put into effect would come within the jurisdiction of the various County Boards of Commissioners of the counties they immediately took steps, which was right, to kill the bill. We have in this State perhaps the best functioning Plant Board in the United States. A little over a year ago in my travels in California I heard it very favorably spoken of by the Californians and whenever they go to the limit to say anything good of any other country they are going some; and they certainly complimented the Plant Board of Florida in that they said they had watched it very closely and tried to follow. Being one of the committee to draft this bill, I got in touch with the Plant Board and they tentatively drafted a bill which they thought would meet our requirements as growers and still bring it within the functioning of the Plant Board to put into effect.

Some may want to know why we didn't include all the diseases and pests. You could not do that if you were going to have your county commissioners put it into effect or if you were going to leave it to your growers to exercise. Therefore, they have only included in this bill such pests and diseases as it is possible for the grower, under the instructions of the Plant Board, to eradicate or control. For instance, you could not, as a grower, eradicate citrus canker as has been done, nor the black fly and some others; so the Plant Board has seen fit to include in this bill only such as can be controlled by the grower himself under the instructions from the Plant Board. If we should

leave it to our county commissioners to put into effect we would be just where California is as that is their law and they have cautioned us not to make that mistake because very few of our county commissioners are plant men. Now, I am going to read this bill, as tentatively drawn by Judge Hunter, the Florida Citrus Exchange attorney, who is interested in this kind of work, and then submitted to the Plant Board. They have made their corrections and again returned it to Judge Hunter for the final touches. This bill that I will read you here is the tentative draft which has not the corrections of the Plant Board. However, the Plant Board drew the original. (Reads bill.)

Growers, the time has arrived in the growing of our fruit when the quality of the fruit we are growing and are going to grow must be improved. This year there will be shipped thirteen million boxes of fruit and the crop for next year is estimated at twenty million. You can all certainly see the necessity of growing good fruit or going out of business. Unless we properly cultivate, fertilize and spray our fruit, keeping it clean and bright, we are certainly going to have to go out of business. It has been coming to that point and it is right on us—it is here now. We have seen during this year of cheap prices, that good desirable fruit has brought only fair prices. However, considering the reconstruction period we have not fared nearly so poorly as some other lines of business.

If I did not spray my grove and you across the road did, it means that you have got to do more spraying and more cleaning up of your grove to bring it in a

proper sanitary condition than you would if I kept mine clean. So we want to see to the man who will not properly spray his grove. If he has insects or diseases sufficient to become a menace, which will be decided upon by the Plant Board, and that can be eradicated, or controlled, if he won't do it, the authorities will go in and do it for him and charge it to his property. I would like to see this Society go on record as favoring this law. It will help us some. It gives each county the opportunity to vote on it. You, in a county, can have it or not, as you wish. We of Polk County believe we want it and if given the opportunity we will have it. We believe if it is ever tried out the rest of you will have it. I am called away this morning and will have to leave now, but I want to leave this in your hands. I hope you will pass a resolution endorsing the passage of this bill. I thank you.

Hume: What is your pleasure in regard to this matter? Shall we leave it now and take it up later?

Mr. ———: I move that we endorse the bill as read.

Mr. L. B. Skinner: This may not be called "compulsory spraying" but that is its name. I am in favor of a bill of this kind. I am in favor of spraying—there are many people who are not, and who are, in fact, absolutely opposed to it. It is a question to which there are a good many sides. This Society is made up of all these different people. This Society has certain work to do and I don't think that endorsing bills of this kind is the business of this Society. I think it is a great mistake. I think it is aside from the order of its business and it is an un-



wise thing to do just at this time. The Plant Board is going to have hard sledding this year to get along; it is going to have hard sledding to have the legislation passed that it needs and it is my idea that we have got to concentrate, that the Plant Board has got to concentrate on as large a program as they think they can carry through and stick to it. Every one of these things will make enemies and, believe me, we haven't too many friends. I think it is a serious mistake and it is not, to my mind, the policy of this Society and I think it is out of order.

H. H. Hume: I listened to the reading of the bill very carefully myself while Dr. Sample was reading it and unless there were some modifications in it I would not be willing to endorse it myself because it requires in that bill the destruction of certain insects and pests which I know cannot be destroyed in Florida and yet that is plainly stated in that bill. It stands for established instructions, names the pests that are to be destroyed or exterminated and I don't think it can be done. Now, I am in favor of a bill of this type if properly drafted but I don't believe this bill will fill the bill. It refers to the extermination of whitefly, to the extermination of pecan scab and refers to the extermination of a number of things that cannot possibly be exterminated, and that clause is so tied up in it that I know what we would be going up against. I know what we have gotten up against in our present Plant Act.

F. W. Raine: I am very much interested in hearing the reading of this bill. I have been in public life about thirty

years in five different states and if there is anything it strikes me that you want to go carefully on it is the question of legislation. I am with a new organization that desires to go into various lines of horticulture and we are coming into the State where conditions such as tropical conditions, insects, diseases and all that sort of thing, are different, although I have had actual training along these lines. Now, I am delighted to hear the Plant Board patted on the back, as it were, and I believe they are patting themselves on the back, but, after all, the laws that we have already are not properly carried out; they cannot be properly carried out. I know myself, having been a State official. To pass the legislation is the last thing. The thing to do is to get something that will work out and give us the desired results. Now, notwithstanding the training and experience I have had, since I have come into Florida I have run into many little technical misgivings here and I think those things ought to be cleared up rather than the passing of new legislation. Now, as a matter of fact in Palm Beach County we have many orchards there that doubtless have almost all the various pests or insects in them if you go after them with a microscope. The laws that have been passed by the State I believe don't apply to many of these conditions and I believe you have got to go mighty careful in passing a bill of this kind. Throw our energies on what has already been done and get results from them. From talking with practical men I think there is an undercurrent of feeling that the Plant Board, for instance, is too chesty and



that the laws are too sweeping and I tell you, gentlemen, while it appears in the State Horticultural Society as one of the finest laws being worked out, etc., under ground you will find that the strongest men and those we are looking up to, feel that there is a lot of red tape about it and we have got to all pull together and work out something satisfactory. I would by all means kill a proposition of this kind immediately.

H. H. Hume: I think, Mr. Raine, you are in a very unpopular place to be talking against the Plant Board, for the most of us are well aware of the wonderful work which has been done and is being done by that institution.

Mr. Mark Sample: As I understand it, this is a tentative bill and the title of the bill is "Pest Control Act," is it not? It is, as Mr. Skinner has just said to you, practically compulsory spraying. If there is anything we need in this State it is compulsory spraying. I believe all the best growers will agree with me that we must have spraying and the only way to have these things is by compulsory spraying. This particular bill is not the one that will be presented perhaps, but is the bill prepared by the Plant Board to be corrected as deemed necessary. It is practically impossible to exterminate whitefly, but, Mr. Chairman, I do think it is very important that we have a bill enacted in our legislature called "Compulsory Spraying."

Mr. M. G. Campbell: From my experience in attending the legislature of this State in 1917 and 1919 I would say that that would be a bad bill for this association to indorse, although I personally am in favor of that bill. If the whole

State of Florida were a citrus-growing State instead of the southern part, it would be a different proposition but had that bill been in effect when we were asking for an appropriation for citrus canker you know what the legislature would have told us. They would have said, "Citrus canker is not included in that bill because you did not know it. We will include citrus canker in this bill and let each county pay for eradication." If we should get black fly we would meet that same proposition in Tallahassee, I am positive. We may have to go there for an appropriation for that purpose and if we do, you know what the legislature would say to us—"Black fly was not in Florida at that time; we will include it in your compulsory spraying bill and let each county handle it." If that had been the case with citrus canker we would still have citrus canker. That is a good bill and I think every citrus man is in favor of it, but I think every citrus man who has had experience in Tallahassee knows what he is up against. When the entire citrus industry was threatened some thought it would be simply a matter of going to the legislature and asking for an appropriation, but, take it from me, it was not such an easy matter to get it. The citrus industry was seriously threatened and if we had had a bill of this kind we would have citrus canker today, although it is a good bill.

Mr. H. H. Hume: I most thoroughly indorse what you have had to say, Mr. Campbell. Any further discussion?

Mr. Skinner: Moved that bill be laid on the table.

Moved and seconded that bill be laid on the table. Motion passed.

# The Refrigeration of Citrus Fruits

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Paul Mandeville, Orlando

Nothing is so dispiriting as to see a great opportunity passing unimproved. Never mind who said it, this is the dispiriting part of the situation today. The greatest fortunes of the last generation were laid in the reconstruction period after the civil war. There were in those days the hang-overs from the war days, the profiteers and the cunning men, Jim Fisk and Daniel Drew, but who hears of them today when the great fortunes are mentioned?

And what was the foundation of the great fortunes? First of all a basic field of work, essentials, steel, oil, food and I might add drink. The names of the men who made these fortunes are too familiar to recount them. Their methods were, on the whole, commercially sound and honest. Above all, they had vision.

Yet Carnegie said in the seventies that no man would ever make a large fortune in meat, and, behold, how soon was his vision out-run by the Armours, Swifts and the Morrisises! And who can say that oranges and eggs are not the great opportunities of today?

I mention eggs because I want, with your permission, to digress briefly from the subject given me, to say that I have observed an opportunity for profit in your groves that is not generally taken advantage of in Florida. I speak with a

broad and particular knowledge of both trade and farm conditions in the poultry industry when I say that there is not only a good profit in raising poultry and eggs for the Florida markets; but you have a wonderful natural range for poultry in your groves, unexcelled anywhere for soil, shade and feed. And without my having much knowledge of the needs of your fruit trees I can see all about me the use of enormous quantities of fertilizers and enormous sums spent for spraying and fighting insects and I can tell you that poultry is an enemy to insects, feeding on them, and where poultry ranges in sufficient numbers, the ground is constantly fertilized.

I also see the splendid groves and splendid poultry where these industries have been combined in Florida. And I have a suggestion to make that I believe is worth thinking about. You men who are used to co-operation should get together in groups according to the size of your groves and the number of head of poultry which one man can care for, and you should get specialists to introduce poultry into your groves. Some of you are good poultry-men and might turn to this development with profit; and there are thousands of skilled poultry-men in the North who would seize the opportunity to come to Florida, did they know the

conditions in their line and if you would see the need of their help and the profit you are letting slip out of your hands.

#### AGGRESSIVE ECONOMY

Tales of the Chicago fire were still fresh in my childhood. I remember a neighbor who lost property in the heart of the city and who was found the morning after with hammer in hand cleaning off the mortar from the smoking brick. This should not be surprising, but it is human nature to talk a good deal, especially after a great disaster. Our neighbor saw the bricks where his building before stood and he entered at once into the spirit of his problem. Our neighbor died rich.

We have got to forget the aims of yesterday and clean the brick from our own house before we can build again. We have got to build with the bricks at hand. There have been changes too far-reaching for us all to begin with new materials. We cannot borrow freely from one another. All have met the same turn together and all have got to build anew. The sooner we get at this business the better. After glorious times of aggressive expansion, we have got to practice aggressive economy. Let us enter into the new spirit heartily, to win. Economy is not a negative thing. It means the investment of time and money. Economy means husbandry and prevention of waste. As all have been liberal in times of expansion, so all now have got to economize and the problem is a scientific one. We have a great work ahead.

Of the sum represented by the selling price of citrus fruit today, about a third

consists of freight; a third, of packing house charges; and a third, of the growers' costs. There is no profit. If we are to get a profit in the future, we must get it out of these charges, or out of what we can save of the fruit that is spoiled.

What the buyer can pay for your fruit is all you have to work on, and you may be sure he will for some time to come take advantage of every general economy which you can devise and will reduce his price. He is not looking out for your profit but is practicing economy like you. All are buyers and all are doing the same thing. So if growers and shippers are to make a profit, they have got to be aggressive, more aggressive than the buyer and more aggressive than other growers and shippers. You have got to get your brick cleaned first and be the first to build. That is what I mean by aggressive economy.

#### REDUCING THE FREIGHT AND OTHER SAVINGS

I have said something about one chance for getting a profit or saving in the *grove* and I want to say something of the savings to be made in the freight, and from what we can prevent of the spoilage.

A great deal is said these days about high freight rates in connection with your costs. Like all the rest, we are crying down the other fellow. But do we offer a constructive remedy? There is a constructive remedy for high freight rates and it is to get value for what you pay; better service and, above all, better cars. You need the very best refrigerators because of certain climatic conditions in Florida which I shall mention



later. You have had to stand for using poor and worn out cars which no other section of the country will consent to use. It is the belief of some railroad men that winter shipments do not require as good equipment as do summer crops, so you are asked to use up the old cars. I saw one last week that had a hole in the door large enough to throw a base ball through it. Whatever your needs, these cars are not right and are the cause of grave losses. They make uncertain the benefits of one of the greatest savings you can make today, the saving in ice. And they undo all fine work in refrigeration.

There are today enough refrigerator cars built to the so-called United States standard, and enough more building, to scrap some thousands of these cars that are not only worn out, but never were refrigerator cars in the right sense of the word. I believe it lies within your power to do this thing now. The railroads have taught you how to do it. They tell you how many nails you must put in your orange boxes before they can be used as standard and take the rate applying to oranges properly packed. Why do you not petition the Interstate Commerce Commission for a tariff defining what is a standard refrigerator car, how it must be built and in what condition it must be before the railroad can charge you for refrigerator service? How can the Interstate Commerce Commission refuse this demand for *your* protection with all the definitions now in the tariff put there on petition of the railroads for *their* protection? Why not outlaw these old cars and do it now?

Then there is the saving in ice on fruit that has been pre-cooled. Ice will not be cheap for some years to come. That is one reason why your freight bills are high. The railroads rightly charge you for the ice, for the cost of icing the cars and for the interference to their schedules for frequent icing in transit. Pre-cooled fruit is not iced in transit. The cars are iced once before shipment. When pre-cooling has become general, train schedules can be shortened and further savings made.

Fruit and vegetables that have been well pre-cooled enjoy all the benefits of full icing in transit at the cost of once icing before shipment. In dollars this means that five hundred cars of pre-cooled fruit will save sixty dollars a car in cost for ice or thirty thousand dollars. And one of the pre-coolers completed last fall has done just that. And the pre-cooler is already paid for out of this saving among others.

Another saving is in the price of the fruit and the prevention of decay. All citrus fruit is not equally perishable and some of it is quite hardy. But seedlings and late varieties that are shipped in warm weather are greatly benefited by pre-cooling. Some localities will never be able to solve their losses from decay in any other way. It is not possible to reduce savings from benefits of this kind to dollars as we can in the case of ice because such a figure would be mere guess work, but the savings are very great nevertheless and they are greater in some districts and for some fruit than in other districts and for other and hardier fruit.

Pre-cooling is beneficial to *all* shipments when the weather is wrong.

#### ACTION OF WATER

Now what do we mean by wrong weather? I have seen strong men in tears when the wind was in the east. You who grow vegetables know even better than do fruit growers that the warm, moist winds from the east carry sickness to these products. Fungus and all kinds of parasites now appear to add to the grower's risks. Just what happens is the very same phenomenon that we reverse when pre-cooling. The warm, moist winds, blowing over the fields and through the packing houses deposit their wetness on everything just as the cold dry air of the pre-cooler must take up that wetness again.

It is at this point that most of the past mistakes have been made in pre-cooling and in shipping after pre-cooling. But I shall explain. A simple illustration is this glass of ice water which you see is covered with dew. *Now the dew is forming on the surface of the water even faster than it forms on the outside of the glass, but the dew on the surface of the water is dissolved in the water as fast as it forms, so it is not seen.* Thus the cold water drinks up the moisture from the air and keeps on drinking it up as long as the water is colder than the air. In time, if the ice is not renewed, the water will become as warm as the air of the room and will cease drinking up the moisture from the air. And should something happen to make the water warmer than the air, or the air colder than the

water, then the water will give back its moisture to the air.

So you see that in a country surrounded by the sea and full of lakes and rivers with winds blowing from everywhere, these changes from damp to dry and from dry to damp are constantly recurring. What we must do is to see that they occur the way we want them to. That is what proper refrigeration, properly applied, enables us to do.

But we have to keep the principle of the evaporating and condensing waters always in mind from the time we harvest until the vegetables or fruit are sold and eaten. And when once we commence to refrigerate, we must carry these principles in mind until the end of the journey for we are working with products that are colder than the air and that will attract moisture just as this glass of ice water.

Again, while our perishable is being pre-cooled, it is warmer than the air in the pre-cooler and consequently is giving off its moisture. You can even see it steam, clouds of vapor appearing when the vegetable or fruit is quite warm. And without some provision to take away the vapor in the air, it loses its capacity to cool as well as to take up moisture because, to cool freely, the product must evaporate. Fast pre-cooling is not only better for the product but it requires less of an investment in rooms in which to do the work, because more fruit is pre-cooled in an equal time. There are other savings due to fast pre-cooling and some of them are important. I do not know of any advantages of pre-cooling slowly. The difference in this respect between

cold storing and pre-cooling, or getting the first heat out of a warm, fresh product, is frequently not well understood. It *must* be understood in order to make progress in the art of pre-cooling.

Now all successful methods that I know of for pre-cooling hot products that have moisture to give off, provide a way for removing the water given off. Citrus fruits, most deciduous fruits, berries and watery vegetables contain a large amount of water and have to give off part of it in pre-cooling. So we come back to our glass of ice water and say that modern practice has adopted the so-called open brine methods for pre-cooling, because they are much faster than methods which use brine or ammonia in pipes. Moisture does deposit on pipes in the form of frost, but not in the quantities taken up by the finely atomized open brine. And as the pipes become encrusted with frost, they lose not only their power to take up water, but also their power to take up heat.

Open brine pre-cooling has now been applied in Florida to citrus fruits and has been tried on celery with excellent results.

#### WORK OF THE EXCHANGE

I need make no apologies for saying that without the backing of certain officers and others interested in the Florida Citrus Exchange, this important development would not have been undertaken, and could not have been carried to the point where we have arrived. I have had long experience in my line with so-called independent packers all over the country and I have met many progressive and broad-minded men, some of whom would

not hesitate to go the limit, within their means, to advance the interests of their associates, and competitors, too, along with their own. All co-operation does not lie in co-operative movements. But I have been captivated by the enthusiasm of these Florida men, and their vision. The specialists working with them were encouraged to great efforts, and all will benefit. You will have to explain to me *why* it was. You may say that their relation to the original and final owners until your products reach the final market, enables them to do things which an independent cannot do and keep his head above water. I do not assume to explain. I simply say that the support given to our efforts by these men was bound to bring results and has brought results of the most far-reaching importance to Florida and the interests represented here tonight. In the discussion that I understand is to follow this paper, I may have an opportunity to tell you some particular applications that have resulted from our recent work together.

I have, of course, only touched on the need for pre-cooling and the changes that will follow in trade practice. When we learned to ride a-horse-back, travelling on foot was a weary way. And when we learned to ride in a Pullman, the old day coach was somehow uncomfortable. I like to walk. No man can tell me that it is better to ride in a Pullman than to walk in the original fashion of travelers. One sees more and feels better at the end of a day's walk than at the end of a day in a Pullman car, at least I think so, but I ride in a Pullman because my business



is to get there in the work which it is my mission to do.

That is the way with refrigeration, when it comes, it stays. And it is not unlike the Pullman car either. Refrigeration is an anaesthetic, it puts all the little parasites to sleep to the journey's end and permits you to do in comfort and certainty what only the most skillful of you can do by watching the weather and governing your day-to-day practice according to the changing conditions. Like an anaesthetic, too, refrigeration enables us to perform operations that without it would be impossible. So soon as refrigeration appears, new trade practices fol-

low in and before we know it, we all have to have it. The most profit is to the man who gets it first. This has been the experience with every product to which refrigeration has been applied; it will be your experience.

I have not been here long enough to speak with authority on some problems ahead of us. In the fifteen months since I came to Florida for this work, I have returned north seven times and have as promptly felt the pull and returned to Florida. Whitman would probably say that I am hooked and don't know it. I may have swallowed the hook; but I can truthfully say that it does not hurt a bit.

# Going in Partnership With Nature

W. E. Sexton, Vero

Mr. Floyd has given me the subject of "Packing and Shipment of Citrus Fruit." Why Mr. Floyd continues to put me on the program when he knows that I have only been in your State for seven years, to attempt to talk on a subject to men who have been living here for 25 and 30 years is something I cannot tell.

I do not pretend to know much about packing or shipment of citrus fruit, so you will please bear with me while I take up my lot of time on this program. I will try to make this talk as short as possible. I feel like a "tender-foot" when I get among you men who have had many years of experience. While I am growing some fruit and have a packing house at Vero, yet I am always conscious of my ignorance on certain lines of this work and it was never brought so forcibly before me until last winter when one of the old "hard-boiled" growers in our county who had successfully out-guessed most of the buyers of citrus fruit for the past five or six years, sent word for me to come and buy his fruit. I have a man who works with me in the buying of fruit and picking and when I called on this "hard-boiled" customer I took my field man with me. We looked over the grove very carefully and after getting his idea of prices and number of boxes on the different groves we could tell from our own

estimates that this man had planned a fine trimming for us should we have taken the fruit at his figures. This we did not do and the next day, in talking to one of my friends this gentleman said, "I would like to know why that big tender-foot brought that d—— little 'cracker' with him."

However, I believe that I have been able to get up some information in the past two years of operating our packing house, which might be of interest to the growers who are selling their fruit. First I want all the people who are actually growing citrus fruit to hold up their right hand. Now, I want the people who are selling fruit on the trees to hold up their right hand. Now, I would like to ask a few of these gentlemen who are selling fruit on the trees what percentage of their fruit grades fancy, what percentage goes in the second grade, what percentage in the third and what percentage in the plain. For your own information we have shipped during the past year, up until the time I had these figures prepared for me, 6,562 boxes of oranges. Out of this number of oranges 18 per cent were fancy; 47 per cent were F. G. brights; 21 per cent golden; 5 per cent russetts; 7 per cent plain. We shipped 27,067 boxes of grapefruit, which represents the grapefruit from some of the best groves along the Indian River and

from groves whose owners would almost be willing to swear, if we were to talk to them about buying their fruit, that 50 per cent or more of their fruit would grade fancy. Our records show that only 5.5 per cent of this grapefruit packed out fancy; 23 per cent F. G. brights; 34 per cent goldens; 12 per cent russetts and 21 per cent plains, and I mean by plains that the fruit was so poor and indifferent that we did not want to place our brand on this fruit at all.

Now it is very easy to sell the fancy fruit, and I would be willing to pay a premium of \$1.00 a box for all fancy fruit that goes through my packing house, over any other price which I may pay for the general run of fruit. The result of our past experience with packing fruit is somewhat discouraging as far as buying is concerned, and I believe if the growers in our State, and particularly in our community, do not use the very best method of spraying, the quality of our fruit will deteriorate to such an extent that it will be hard for them to market it at any price. A lot of this fruit does not run uniform and it looks to me like a hopeless proposition, to get a high grade of citrus fruit until some new groves are set, where men have taken some pains in selecting their bud wood with an idea of getting uniform color, size and quality.

It reminds me of the man in Indiana, the state from which I came, who took his children to the country to visit one of his friends. Arriving there he found four big, husky boys, and remarked to the farmer, "I am wondering if you can tell me how I can care for my boys in

such a way that they will grow up like your boys." The farmer said, "I cannot help you out. If you want to grow boys like mine, you would have to begin with your grandfather." I think that the growers of citrus fruit should have a standard of perfection in their minds and try to produce fruit as near this standard of perfection as possible. I have had some experience in improving corn and at one time was a corn judge in my state. You people here who are familiar with growing corn may know that Shelby county, Indiana, has for a number of years taken all the prizes at all the National Corn Shows; a great many of the State shows and some of the World Fairs. Growers there have a score card by which they judge corn, and all growers of any importance keep these score cards before them in selecting their seed corn. They are always attempting to reach this standard of perfection which the score card represents and by doing this they have made wonderful progress in the development of corn in their community.

With this in mind we advertised and encouraged the growers in our community to submit samples at our County Fair so that they might have their fruit judged and get some idea of a perfect fruit. Several of the growers got together and adopted a score card for judging citrus fruit. We gave the qualities which we considered the most important, a certain number of points according to their importance in judging the fruit, and I will read this score card to you in order that you may know what we are doing. The



growers got a lot of good from this little exhibit that we had and it gave them something from which to work and by which to judge their fruit. I believe that it will have a beneficial effect on the crops to be produced in the future.

Uniformity was given -----	10 points
Color -----	10 points
Trueness to type -----	10 points
Quality -----	70 points

Under the heading of quality we had:

Texture and thickness of skin---	10 points
Percentage of juice -----	15 points
Sweetness -----	10 points
Acid -----	10 points
Seed: number and position----	5 points
Flavor -----	10 points
Tissue -----	10 points

We gave quality 70 points because we figured that quality, from a market standpoint, is the most important thing to be considered in fruit. In describing these different points so that the growers would understand them we explained that Uniformity (10 points) takes into consideration color, uniform size and shape. You all know the Color (10 points) we look for in both grapefruit and oranges. *Trueness* to type (10 points) refers to the different varieties. *Quality* (70 points) takes into account thin skin with velvety texture, heavy per cent of well-flavored, sweet juice, with enough acid to keep it from being insipid. Seed should be nested near center with as little core and as few seed as possible. Flavor should be pleasing to the taste and

true to variety. Tissue should be free from excessive fibre and coarseness.

In regard to the packing of fruit and preparing it for the market, I think of grapefruit and oranges singly and as individuals. You have, or should have, an ambition and that ambition is to have as nearly perfect fruit as possible for before the close of its career it should find its way into some of the finest homes in our country. In order to do this these fruits must be groomed and dressed up, if you please, the same as an individual, when getting ready to go to any of our large cities, would first think of seeing that his clothes and everything were in perfect shape, in order that he might make as good a showing as possible. The man who overlooks this fact and allows his fruit to go into the market with its "heels" run down and in a shabby condition will find his fruit will receive about the same reception as an individual would who attempted to go in under the same condition. It is very easy for the individual, who prepares himself before going, to get most anything he wants when he gets into the large cities. If he does not prepare he will have a hard time and it is the same way with fruit. The fruit which is well-packed and dressed up and prepared for the big event of its existence, finds open hands to receive it in the Northern markets and men eager to help it along and get it into the very best families. But the indifferent fruit is scoffed at and left standing in the street and as a result is a disappointment to the grower and also the man who has attempted to sell it and distribute it for the grower.

# Problems in Shipping Citrus Fruits

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A. R. Sandlin, Leesburg

This is a question which concerns more than the grower or shipper, for upon the final solution rests the success and prosperity of the industry as a whole, and this prosperity will naturally spread in all directions and make for better times and conditions, not only for the grower but for the grove labor, packing house labor, the banks and the transportation companies, etc.

The citrus industry has made a large growth within a comparatively short period, and with conditions promising a crop of from 15,000,000 to 18,000,000 boxes for the season of 1921-22 the growers, shippers, the many marketing agencies and the transportation companies are thinking and discussing this shipping problem as much or more than they are the further development of the industry.

The grower is beginning to realize the vital importance of growing the very best quality of fruit possible to produce in his locality; and the time is not far distant when the grower who does not grow a higher grade fruit and does not better his shipping conditions, will be compelled to abandon his grove.

With all grades of fruit, it is important and necessary that the best care possible in picking and handling the fruit from the trees to and through the packing

house into the car be practiced. The once tough and leathery rind seems to be passing to a more sappy and tender condition, and this together with the many different factors that shorten the carrying life of the fruit, has compelled our government and our better thinking people to set to work to better our shipping conditions. The result is better packing houses; better ventilation; better machinery, which is being improved from season to season; and what is probably of as much if not more importance, the pre-cooling plants are beginning to find their place where needed most. In the long warm and damp climate where we grow our fruit we can pack and cool it to that degree which will insure safe shipment under most any and all conditions.

The industry has grown to such a point that it is important that the growers and shippers keep well posted as to the daily shipments so as not to be forced to use improper cars until the transportation companies can furnish sufficient and proper equipment. It is also important not to pick the fruit in foggy, misty or rainy weather, which is too often done merely to hold the crews together. This invariably brings grief and especially so where a pre-cooling plant is not available.

All the above requires heavy expenditures but if judiciously handled, it is an

investment and not an expense and strengthens the confidence in all shipments.

Our crate material has received the most critical consideration during the past season, and rightly so, as the crates should be strong and capable of standing any reasonable punishment which is liable and will come to most any shipment. Therefore, it is necessary that the crate be made of the very best material, well stapled, and made with from four to five cement coated nails to the cleat. They should be loaded into cars, with each box on end, and tightly loaded so as to prevent shifting and breaking; with two strips on the top of the bottom tier, and with a nail in each strip to the box. The top tier should be loaded likewise, one strip to each tier and this strip should be against one side of the car and alternating for each tier. However, the safer loading would be two strips to each tier on the top with the ends of the strip in contact with one side of the car and the other to the opposite side of the car, leaving space for ventilation in each car and between each row of boxes.

As above stated, with the enormous amount of fruit to be shipped and taking into consideration the high cost of material such as boxes, nails, paper, etc., there is no doubt in my mind that the time has arrived when the lower grades of fruit will necessarily have to be shipped in bulk. During this season the packing material and labor have cost in the neighborhood of from 90 cents to \$1.00 per box, after the fruit reaches the packing house, to place it aboard the cars

ready for shipment. The continual flow of this lower grade of fruit from the State in this manner only adds to the cost to the consumer without helping the quality of the commodity. It is somewhat like going into a store and buying a dozen eggs for 50 cents and paying the merchant a dollar for a container in which to carry your eggs home. There has been possibly more bulk shipments from the State during the past season than during all other seasons combined and has proven to be a successful and satisfactory method of shipment. With the fast depletion of the forests and the increasing cost of manufacturing, crate material seems to be settling on a base of higher prices than ever known except during the war and yet the law of averages should bring the prices to a reasonable figure, and especially so if the crate manufacturers will permit the business to revert back to the old quality and on a competitive basis. The present prices only tend to make necessary the devising of some plan whereby the low grades and off quality of fruit must be handled with less expense, if the industry survives with this class of fruit.

In transporting our citrus fruits there are many problems in which we are all more or less concerned and the foremost thought in the minds of the growers and shippers is that freight rates must be reduced. The rates are evidently slated for a reduction but just how much still remains to be figured out and settled on by the shippers, transportation people and the Interstate Commerce Commission. The transportation companies are in a



precarious condition for they fully realize the importance and the necessity of freight readjustment though they are not in a position to and cannot take action because they are hampered in every direction, either by the Interstate Commerce Commission or the Labor Board. Recently the Southern railroads willingly agreed to allow unlimited diversions or re-consignments, after they were convinced that this practice was not being unnecessarily used and that the service for same was figured in with the freight rates, and that the right to divert cars would reduce the claims filed against the carriers. But when the matter was submitted to the Interstate Commerce Commission it was refused.

The Labor Board in Washington has refused, and is refusing the transportation companies the privilege to reduce labor on their respective lines. With the Labor Board dictating wages and the Interstate Commerce Commission dictating rates, it leaves nothing for the officials of the transportation companies to do except try to survive the situation until such time as we growers and shippers will take hold of the situation with the view of having the Labor Board removed and bring the fact before the Interstate Commerce Commission that freight rates must necessarily be in proportion to the value of the commodities transported. About 50 per cent of the gross sales of our fruit, boxes, paper, nails and labor have gone to the transportation people as freight during the past season. For the growers to produce fruit requiring from ten to twelve months to make and to invest in

packing material, and then have 50 per cent of the gross sales deducted for a service of from six to ten days transportation is nothing short of suicide for the industry and will bring conditions to such a point that transportation must necessarily be figured out in some other manner and on some other basis.

It seems to me that the time schedule of these cars in transit is also important as the transportation companies are now taking from 50 to 100 per cent more time to transport the cars to destination than they did five years ago. The more or less dilapidated condition of the equipment and cars together with the extra time for movement to destination, has caused the growers an almost inestimable loss, not only on specific shipments, but by poisoning the minds of the receivers to the extent that they fear Florida citrus fruits are weakening to such an extent that the elementary risk is more than they are willing to take, without an excessive allowance in this direction.

We must have more cars that are better equipped for the protection of the fruit in transportation, both during warm and cold weather. Our present refrigerator cars are inadequate to move the bulk of fruit and are in a very bad physical condition and are not protecting the fruit as they should; neither are they holding or maintaining ice as outlined and planned by the refrigerating engineers. Statistics show that there is entirely too much difference in temperature between the first and second tiers of fruit. A car fully iced will refrigerate the contents until the ice has melted away one-third and

will retain that temperature until the ice has been reduced to one-half. After that the temperature of the contents will begin to rise and with the present equipment of cars and the long distance between the designated icing stations this does not seem to be sufficient to carry the fruit between the regular icing points. Hence, we find on practically all shipments heavy extra icing charges which were necessary between the designated icing stations from the different original points of shipment.

The refrigerating car service people have placed orders for about 10,000 cars which will still be inadequate to handle the volume of fruit from the State and take care of the commodities from the other states that require refrigerator cars when our fruit is going forward. The situation has reached such a serious point that the growers on the Pacific coast are now trying an experiment with refrigerator boat shipments through the Panama Canal to the Eastern markets. Two of these shipments have already arrived and their condition was highly satisfactory. The shippers of this State are watching the experiments very closely and I understand that there is a large company in the East which is now ready to figure with the growers and shippers of this State on the transportation problem, with the view

of building boats to carry such shipments, either under forced ventilation or under full iced refrigeration. If boat shipments meet their expectations and prove satisfactory to the receivers, there is no doubt that many boats will be converted and properly equipped for the handling of perishables; and if it were possible to secure reasonable rates from the different seaport points to the inland markets, it would relieve the congestion and would eventually expand into large export shipments which we will need within a very short time. And unless the transportation people or the refrigerator car companies are more particular and come to the relief of the situation we will no doubt be compelled to encourage the water transportation in order to move the bulk of the different perishable products from our State.

If we will set to work to grow a better quality and a higher grade of fruit, using every discretion in the grade and pack, and insist upon a faster schedule and better equipment, cheaper rates and better shipping conditions, we will no doubt push forward and prosper and the industry continue to grow and expand and meet fully the expectations of all the growers who are operating and co-operating economically for the betterment of the conditions of the industry.

# Annual Reports

## REPORT OF AUDITING COMMITTEE

We, the undersigned, your Auditing Committee, beg to report that we have carefully examined the books of the Secretary and Treasurer, finding them correct.

M. G. CAMPBELL, *Chairman*.

GEO. W. PETERKIN.

April 14, 1921.

## REPORT OF SECRETARY

Cash Account to April 14, 1921.

### *Receipts*

Receipts from membership fees, interest on bank deposits, sales of back reports ----- \$4,284.93

### *Expenditures*

19 bills including remittances to Treasurer ----- \$2,297.45  
Balance on hand ----- 1,987.48  
Total ----- \$4,284.93

## REPORT OF TREASURER

Treasurer's Account on April 6, 1920.

### *Receipts*

1920  
May 7, To balance in treasury ----- \$1,149.73  
July 24, Secretary Floyd ----- 1,600.00  
Sept. 14, Interest ----- 1.38  
Dec. 10, Interest ----- 21.49  
1921  
April 6, Interest on Bonds ----- 61.00  
-----  
\$2,833.60

### *Credits*

1920  
May 12, By \$1,100.00 L. Loan Bonds ---- \$ 988.62  
Oct. 22, By \$600.00 Victory Bonds ----- 593.00  
1921  
Feb. 12, Telegrams ----- 1.00  
March 7, E. O. Painter Printing Co. ---- 1,171.60  
April 6, Balance ----- 79.38  
-----  
\$2,833.60

W. S. HART, *Treasurer*.

## REPORT OF EXECUTIVE COMMITTEE

Meeting of Feb. 16, 1921.

The Executive Committee of the Society held its usual spring meeting in the office of President Hume at Jacksonville, on February 16, 1921. The meeting was called to order at 10:30 a. m., there being

present Messrs. Floyd, Hume and Niles and Hubbard by proxy; and Messrs. Frank Stirling and A. A. Coult as visitors.

The minutes of the meeting of May 6, 1920, were read and approved. The



dates for the thirty-fourth annual meeting of the Society at Miami were set for April 12, 13, 14 and 15. Plans for the program of the meeting were discussed in detail.

The resignation of P. H. Rolfs as member and chairman of the committee was read and accepted.

Mr. Frank Stirling, chairman of the Membership Committee, outlined his plans for a membership campaign. They were discussed in detail and approval given. Mr. A. A. Coult, chairman of the Publicity Committee, discussed the plans of his committee for advertising the Miami meeting.

The secretary brought to the attention of the committee that the Society lacked \$931.64 to complete payment of the printer's bill. The treasurer was instructed to complete payment of this account by means of a ninety days' trade acceptance. Plans for raising money to take up the

trade acceptance were discussed, but action was deferred until the annual meeting at Miami. There being no further business, the committee adjourned.

#### Meeting April 14, 1921.

The Executive Committee of the Society held a meeting in the Central School building at Miami on the evening of April 14, 1921, there being present Messrs. Hume, Niles, Hubbard and Floyd.

The minutes of the meeting of February 16, 1921, were read and approved. The secretary reported a total of 1,867 members to date. He was instructed to have the proceedings printed in amount of one hundred copies exceeding the total membership at time of going to press.

The deficit reported at the February 16th meeting was discussed and it was decided to raise the amount by subscription. There being no further business, the committee adjourned.

## REPORT OF MEMBERSHIP COMMITTEE

(Frank Stirling, Chairman)

Your committee respectfully submits a report of the membership of the Society for the year 1921.

The following table briefly shows the growth of the Society for the past twenty years.

Year	Place of Meeting	Patron Members	Honorary Members	Life Members	Perennial Members	Annual Members	Total
1902	Tampa -----		2	51		362	415
1903	Miami -----		3	55		744	802
1904	Jacksonville -----		3	59		553	615
1905	Jacksonville -----		3	63		512	578
1906	Jacksonville -----		3	73		459	535
1907	St. Petersburg -----		2	79		608	689
1908	Gainesville -----		2	83		597	682
1909	Daytona -----		5	81		509	595
1910	Orlando -----		5	89		440	534
1911	Jacksonville -----		4	94		417	515
1912	Miami -----		4	96		773	873
1913	DeLand -----		4	104		665	773
1914	Palatka -----		4	108		864	976
1915	Tampa -----		4	110		873	987
1916	Arcadia -----		4	114		608	726
1917	West Palm Beach -----		4	113		553	670
1918	Fort Myers -----		4	119		840	963
1919	Orlando -----		3	121		1244	1368
1920	Ocala -----	21	3	134		1469	1627
1921	Miami -----	31	5	133	8	1777	1955

# Resolutions

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## GOVERNMENT LABORATORIES AT ORLANDO

*Whereas,* The investigations of insect pests and diseases of sub-tropical fruits being carried on at the Government Laboratory at Orlando, Florida, are of inestimable value to the citrus fruit industry of the State; and

*Whereas,* It is recognized that a careful study of the organisms causing scab, melanose and stem end rot of citrus and their reactions to varying conditions of weather, etc., is of vital importance in formulating economical and effective methods for their control; and

*Whereas,* The appropriations for the furtherance of this work have not been increased in a number of years, so that owing to lack of funds and insufficient personnel and the increasing amount of work resulting from the growth of projects in hand and the taking up of new work, the output is unavoidably slow; and

*Whereas,* It is of increasing importance that a thorough study be made of the life-history of the various insect pests of citrus to formulate more efficient and economical methods of controlling them; and that a study be made of the parasitic enemies, both insect and fungus, of the insects attacking citrus, with a view to their future introduction into the State; and

*Whereas,* It is of paramount importance that increased funds be forthcoming immediately for the purpose of expediting the work on the insect pests and diseases of citrus now under way so as to release reliable information at as early a date as possible;

*Be it Resolved,* That the Florida State Horticultural Society express its deep appreciation to the Hon. Secretary of Agriculture for the valuable work being carried on in the State by the scientists of the Department of Agriculture and respectfully requests his support in obtaining increased funds for the furtherance of the work;

*And Be it Further Resolved,* That copies of this resolution be furnished the Congressmen and Senators from Florida.

H. H. Hume: At various times we have had before this Society Mr. Yothers and Mr. Winston. The moneys asked for under this resolution and the request for continuance of the work, is the work being handled by Mr. Yothers and Mr. Winston very largely and knowing that work as I have known it in the past, and knowing the quality of the men that they are, I am very sure you will agree with me when I say that no more important work has been carried on in the State of Florida and it has been of inestimable



value to the industries in which we are so deeply interested and in which we are engaged. You have heard the resolution as read—those in favor of its adoption will let it be known by saying "Aye," opposed "No." The "Ayes" have it and the motion is carried.

H. H. Hume: Ladies and Gentlemen, there is a matter that I want to bring to your attention in connection with our membership at this time. For many years Prof. and Mrs. Rolfs labored very diligently in this State and very much of the upbuilding of our horticulture in Florida has been due to their efforts. He

is a life member of this Society and Mrs. Rolfs also has been a life member—members for at least twenty years. I think it would be a very nice thing as recognition of their connection with this Society during these many years to elect these two members to honorary membership in the Society. (Applause.) I believe that means that you approve taking care of the matter along this line.

Moved by Mr. Skinner and seconded by Mr. Goodwin that we elect Prof. and Mrs. Rolfs to honorary membership in the State Horticultural Society.

Motion carried.

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## APPROPRIATIONS FOR INSTITUTIONS OF HIGHER LEARNING

*Whereas*, Florida's State institutions of higher learning have not been financed adequately in the past to keep pace with the increasing numbers of young men and young women who wish to avail themselves of the educational advantages for which those institutions were established, and has resulted in large numbers of our young people having to forego the education they had hoped to secure; and

*Whereas*, The same lack of financing by the State has seriously curtailed the work of the Agricultural Experiment Station, placing a great handicap on the development of the horticultural, agricultural and live stock industries; therefore be it

*Resolved*, By the Florida State Horticultural Society in convention at Miami

on April 14, 1921, that we urge upon the members of the 1921 Legislature, the appropriation of the full amounts recommended by the Board of Control for: The Florida State College for Women, Tallahassee; the University of Florida, including the Agricultural College, the Agricultural Experiment Station, and the Extension Work, Gainesville; Florida School for Deaf and the Blind, St. Augustine; and the Agricultural and Mechanical College for Negroes, Tallahassee; and

*Be It Further Resolved*, That copies of this resolution be furnished to Governor Cary A. Hardee; to each member of the Senate and of the House of Representatives; and to each member of the Board of Control.

Passed.

**NO-FENCE LAW**

*Be It Resolved,* By the State Horticultural Society of Florida, comprising a membership of two thousand growers, at its thirty-fourth annual session in Miami, Florida, that;

*Whereas,* At the thirty-third session the platform of the Florida No-Fence League was unanimously indorsed, and

*Whereas,* The Agricultural and Horticultural interests of the State are of prime importance and are the hope of the State's future greatness, and

*Whereas,* The encouragement and protection of the industry by proper and reasonable laws, respecting the prevention

of the roaming at large of live stock is the next step of prime importance; Now therefore

*Be It Resolved,* That we heartily indorse the proposed bill to prohibit the running at large of domestic animals within the State of Florida.

That a copy of this resolution be sent to Senator Oscar M. Eaton and Representative F. P. Foster and that telegrams be sent by the secretary to the Speaker of the House and to the President of the Senate of the present Legislature, evidencing this indorsement.

Passed.

## Election of Officers

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On Thursday evening, April 14, 1921, the following officers were elected for the year beginning January 1, 1922, and ending December 31, 1922.

PRESIDENT—H. Harold Hume.

VICE-PRESIDENTS—L. B. Skinner, W. J. Krome, S. F. Poole.

SECRETARY—Bayard F. Floyd.

TREASURER—W. S. Hart.

EXECUTIVE COMMITTEE—L. D. Niles, B. L. Hamner, Frank Stirling.

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## Selection of Next Meeting Place

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At the evening session on April 14, 1921, Lakeland was selected as the meeting place for the thirty-fifth annual meeting of the Society in 1922. The exact time of meeting will be set by the Executive Committee at its annual spring

meeting in 1922. The invitation for Lakeland was extended by Mrs. Geo. W. Peterkin. Invitations were extended by representatives from Gainesville, Tampa and Orlando, but were withdrawn in favor of Lakeland.



## Final Resolutions

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Edgar A. Wright, Chairman

The Florida State Horticultural Society, in thirty-fourth annual convention assembled, is mindful of obligations under which it rests, to numerous individuals, and others, and being grateful, wishes to express such gratitude as is possible and adequate, and therefore be it

*Resolved*, That we thank the city of Miami for its hospitality and we lay our tribute at her feet in expression of amazement and wonder at her marvelous growth and extreme beauty. That we thank the School Board of Miami for the generous offer for the use of the school building auditorium, where our meetings have been held, and we congratulate the citizens on the possession of such a building. That we thank the officials of the Miami Beach Aquarium for throwing open their doors to members of our Society, and we recommend them for the excellent work that has been done in collecting rare specimens of sea life, believing that this is the best aquarium south of New York City.

That we thank the managers of the Exotic Garden Exhibit, Messrs. Donn, Reasoner and Soar, for the beautiful exhibit of exotic shrubs and flowering plants presented by them in the auditorium of the Halcyon Hotel, believing that the equal of this exhibit of such exotic plants has probably never before been shown in this

country. And we also appreciate the efforts of packers and individuals for the display of citrus and other fruits, believing that they are the superior in quality of any like fruit grown anywhere in the world.

We appreciate the efforts of the U. S. Plant Introduction Garden and of Dr. David Fairchild, and we commend the part he has personally taken in our program, and we recommend that the work of the Garden be continued and enlarged.

We thank J. S. Raney, county agent, for his efforts in our behalf in making all the detailed arrangements for the successful conduct of our proceedings and for our comfort, and we congratulate Dade county for having as agent a man so efficient, courteous and untiring in his efforts in behalf of others.

We thank the railroads of Florida for giving us a rate and a half for the round trip to the convention.

We thank those responsible for the offer of automobiles which made the motorcade to Redlands possible, and we also thank the management of the Deering Estate for throwing open the gates of the estate grounds for us.

And, finally, we thank the officers of our society for good work, regretting that Treasurer Hart is not here to receive these expressions of good will.

# Report of Committee on Necrology

## W. W. Yothers, Chairman

The Committee on Necrology has the sad duty to report the deaths of the following members:

T. I. Arnold, Oak.  
George W. Adams, Thonotosassa.  
James C. Carver, Sutherland.  
E. E. Cannon, Gainesville.  
J. P. Felt, Eustis.  
H. A. Hempel, Gotha.  
Charles J. Haigh, Philadelphia.  
Dr. T. G. Julian, Clearwater.  
A. S. J. McKenney, Stanton.

Andrew McAdams, Melbourne.  
W. W. Mann, Winter Haven.  
Chas. Pugsley, Winter Haven.  
John Schnarr, Orlando.  
David H. Scott, Arcadia.  
Edward Scott, Arcadia.  
W. N. Wilson, Gainesville.

Appropriate biographical sketches follow. These have been especially prepared to show the part the deceased members had in the development of the citrus industry.

## T. I. ARNOLD

Mr. T. I. Arnold was born near Byron, Ga., June 16th, 1860. At the age of twenty-four he came to Florida and engaged in orange culture near Anthony, Marion county. After the big freeze, because of which he lost his grove, he became manager of a phosphate mine owned and operated by Mr. McDowell, in whose employ he remained for some years. Later he again took up orange culture in the employ of H. B. Stevens, at Citra, Fla., where some of the finest oranges in the State are grown.

Still in the employ of Mr. Stevens, some years later he moved to Orlando, where he entered the pineapple industry, in which he spent eight or ten years, during the last four or five years being associated with J. C. Talley in the business. Owing to the difficulty of competing with

the Cuban growers of pineapples, also those of the east coast of Florida, the work at Orlando had to be abandoned, because the price received for fruit was not sufficient to compensate for trouble and expense of raising the fruit under cover.

During the first year of his stay in Orlando, in January, 1896, he was married to Miss Pauline Pugh, a teacher in the Orlando High School, whom he had known ever since coming to the State.

In 1905 Mr. and Mrs. Arnold removed to Jacksonville, where they bought a home, and where Mrs. Arnold taught for years in the Duval High School.

During the remainder of his life he was engaged in the lumber business at Oak, being manager and part owner of the Arlo Box Company.

### GEORGE WILLARD ADAMS

The subject of this sketch, familiar to many of the older members of the Florida State Horticultural Society, for he and his wife were most enthusiastic members for many years, passed away on January 3d, 1921, at the ripe age of eighty-three years and six months. In 1837 George W. Adams was born in Northbridge, Massachusetts, moving from there to Milford in his boyhood. Until young manhood he spent his time on his father's farm. The call of business in Boston came to him and he went there to live prior to 1867.

In July, 1868, he married Miss Hattie S. Humphrey and they made their home in Chelsea for a few years; in 1873 Mrs. Adams died. For some years Mr. Adams and his older brother represented the Davis Sewing Machine Co., throughout the New England States, with headquarters in Boston. After a few years his health failed and his physicians ordered him away from the cold climate. In March, 1875, he married Miss Elizabeth Conant, and they immediately left for Florida, where they spent the remainder of the winter. Mr. Adams improved in health and their next move was to Iowa and Colorado. In 1877 they came to South Florida to live.

Mr. Adams was the first Northern settler to get his homestead from the gov-

ernment and settle at Lake Thonotosassa (Lake of Flints), Hillsboro county. He and another would-be settler traveled by wagon over a large portion of South Florida but found nothing so beautiful as this lake. Here they became pioneers in earnest. There was no railroad as far south as Tampa until 1883, so these travelers from the North went to Cedar Keys thence by boat to Tampa. When he had his land cleared so a house could be built, the lumber was ordered from Pensacola and one can imagine the wearisome days they were hauling this lumber sixteen miles through the pine woods to the present location. Mr. Adams said, "he could feel himself getting better every day," and he did entirely recover from the tubercular trouble with which he was affected.

He set out orange trees, going miles to get trees or nursery stock to put in his grove, then he raised quite a stock of nursery trees, supplying many of the newcomers with trees for groves. Mr. Adams set out about twenty acres in grove but recently sold out all but five acres surrounding his house when he found his strength was not sufficient to care for so many trees. In 1892 he put in an irrigating system that gave the finest results in watering the grove, and gave him more uniform crops yearly.

### JAMES C. CRAVER

Mr. James C. Craver was born at Jonesboro, Ill., December 27, 1849. Early in boyhood he gave evidence of that eager desire for scholarship and knowl-

edge which lingered with him to the end. He was a studious lad. Stories are still abundant of his taking his books to the field and resting his tired horse often



that the boy's mind might gather some more gems of poetry from the book on the stump or fence corner before him. After reading all the books he could find in the neighborhood and passing through the public schools, he entered the University of Illinois. Here he made fine progress, and would have been graduated with honors but for the collapse of his health. In his senior year he was forced to abandon his beloved studies and begin the fight for his life. After a second collapse he determined to seek a warmer climate and selected Florida.

He journeyed by boat and rail to New Orleans. From there he sailed May 18, 1877, for Tampa on the Lizzie Henderson. He landed in Tampa, May 22, 1877, and soon thereafter settled at what is now called the Tampa-Ozona cross roads, where he took out a homestead in the midst of the piney woods. Here he undertook the colossal task of developing a home, without capital, without food and without strength. His diary, which he kept through life, bears most eloquent testimony to the hardships that he suffered during his early days and his humility at

times in having had to borrow the necessary food to sustain life until he could become established. With dauntless determination he struggled on and was rewarded by a great improvement in his health and by seeing the orange and lemon grove which he planted on his homestead develop into a property of value.

With the permanent recovery of his health, Mr. Craver began to prosper in business. He had the first postoffice at his homestead, which was called "Yellow Bluff" and was commissioned on September 10, 1886. This name was afterwards changed to Ozona. After the town of Sutherland was started, he built a store and opened a mercantile establishment, added a line of drugs, became the postmaster, a notary public and general consultant for the entire community. He was conservative and wise in investing his earnings and soon accumulated considerable property. On February 25, 1920, he died, being survived by a nephew, David Craver, of Tampa, and two nieces, Miss Alice Craver and Mrs. Mary Williford, both of Sutherland, Fla.

### JOSHUA PITT FELT

Mr. Joshua Pitt Felt was born in Bigg Flats, N. Y., December 7, 1844. Removed to Emporium, Pa., in early childhood with his parents, where he spent the greater part of his life, being engaged chiefly in merchant milling. He became interested in citrus fruits in 1885 and came to Emporia, Volusia county., where

he planted his first orange grove, and where he built his winter home. His faith in the future of the orange business was never shaken by subsequent freezes and he was actively engaged in the growing and shipping of citrus fruit from 1885 until his death in Eustis, July 3, 1919.

### HENRY A. HEMPEL

Mr. Henry A. Hempel, founder of Gotha, Orange county, Florida, and a former member of the State Horticultural Society, died March 31, 1920, at Buffalo, N. Y.

Mr. Hempel was born in Waltershausen, Gotha, Germany, on October 21, 1836, and after the early death of his father, a weaver, he became an apprentice in a large printing establishment. Coming to the United States in 1867 he followed his printer's trade in several Western states, coming to Buffalo, N. Y., in 1876. He had in the meantime become an American citizen and decided to make Buffalo his home.

Mr. Hempel is the inventor of the printer's metal quoin which is now used all over the civilized world in printing establishments.

In 1879 Mr. Hempel took his first trip to Florida in a search for better health, and was so enchanted by the climate and

natural beauties that he purchased a large tract of land in Orange county, near Orlando. Here he established the village of Gotha, named in memory of his birth place, building himself a handsome residence and bringing to it as permanent settlers many German-speaking families. For the next thirty years he continued to make Florida his home, going North to Buffalo each summer to look after the manufacture of his printer's quoins.

Mr. Hempel was much interested in orange culture, establishing and operating a number of groves, and brought to southern Florida a number of improved varieties of economic plants and breeds of stock.

He is survived by his widow and four children, Mrs. F. L. Lewton, of Washington, D. C.; Adolph Hempel, of Sao Paulo, Brazil; Mrs. J. C. Lang, and Otto F. Hempel, of Buffalo.

### DR. T. G. JULIAN

Dr. T. G. Julian was born Sept. 19, 1864, at the old home place near Frankfort, Ky., which had been the home of the Julians for four generations. He attended and graduated from the old Kentucky Military Institute, then studied pharmacy, graduating with high honors at the School of Pharmacy, Louisville, Ky. He then went into the drug business in Mt. Sterling, Ky., where he remained for eight years.

He had suffered with rheumatism for fifteen years so in 1894 he came to Flor-

ida for his health. From that time he made a study of orange culture, devoting all of his time and attention to it. He came to Clearwater to locate in 1899 and purchased several orange groves which he owned at the time of his death.

I have heard Dr. Julian say many times that he owed his improved health to Florida climate and wished to repay by doing something for the people of Florida. He made a special study of the disease in citrus trees called "foot-rot," and was so successful in curing it in his own groves

that his friends and neighbors came to him for advice as to how to treat their trees for this disease. He wished to make a present of his discovery to the growers of Florida so that they all might be benefited by his study.

Dr. Julian has long been considered an authority on citrus culture in South Florida and was known by growers all over the State as a man who, having made a success in the business was always glad to be of assistance to any one who went to

him for help or advice. The Pinellas County Growers' Association at their annual meeting at Largo in 1918, passed unanimously a resolution thanking Dr. Julian for his work and advice for the growers of Pinellas county.

Dr. Julian died on April 26, 1920, at Clearwater, and is survived by his widow, Mrs. Pattie Chenault Julian, and two daughters, Mrs. S. C. Elbert, of Birmingham, Ala., and Mrs. L. G. Abbott of Clearwater, Florida.

### A. S. J. McKENNEY

Mr. A. S. J. McKenney, late of Stanton, Marion county, Florida, was born at Smarrs, Ga., April 6, 1862. In 1886 he went to Florida and was in mercantile business at Stanton for several years.

He was married in 1889 to Miss Lula Calhoun, of Macon, Ga.

He had an orange grove at Stanton which was cut down by the freeze of 1894 and 1895, which he afterwards rebuilt.

In 1900 he moved to Lakeland and was engaged in mercantile business again, but

as orange culture was what he liked best, he returned to Stanton in 1912, where he made orange growing a success. He gave his entire attention to horticulture and always attended the annual meetings of the Horticultural Society whenever it was convenient.

He had just returned from the meeting at Orlando, May 8, 1919, and was taken ill the next day. On May 11th he passed away, and is survived by his widow.

### WALTER W. MANN

On April 30, 1920, Mr. Walter W. Mann of Winter Haven, Florida, died at Clayton, Georgia. Mr. Mann was one of the most prominent real estate men in the Winter Haven section and was in no small way responsible for the great development which has taken place in that section in recent years.

Mr. Mann was born in Jonesboro, Georgia, October 8, 1870. On August

12, 1896, he married Miss Lola Brassell in Marion county, Florida. About fifteen years ago he moved to Winter Haven, where he has been actively engaged ever since in the development of that section into the garden spot of Central Florida. He is survived by his wife and three children, Walter Herman, his son, being the eldest.



### JOHN SCHNARR

Mr. John Schnarr was born in Hessian Cassee, Germany, April 4, 1851. At the age of about two years he came with his parents to this country. The journey was made in a sail boat and they landed at New Orleans. From New Orleans they went by boat up the Mississippi River to Quincy, Illinois, where he grew to manhood. For a while he was engaged in the mercantile business. From this employment he entered the service of the Noxal Shirt Company, as a traveling salesman. During the next thirty-one years he travelled for this company and the Hargadine-McKittrick Company. After this long period of service there came from exposure incident to the work a decline in health and he sought relief in Florida. He came to Seville about 1905, but very soon found his way to Orlando, where he lived until he died, October 28, 1919. He was married to Mrs. Laura Gilliam of Elgin, Illinois, January 5, 1912, who now survives him. Soon after arriving in Orange county he purchased a grove in the Conway section near Orlando. At this time the ravages of the white fly was

uppermost in the minds of the citrus growers not only in Orange county but the entire State. Mr. Schnarr, together with his nephew, Mr. Hahn, proceeded to develop an insecticide which would be especially adapted for Florida conditions. After many years of experimental work they succeeded in compounding Schnarr's Insecticide. This work alone would entitle him to a very prominent place in the history of citrus culture in Florida. He had many very amiable qualities and traits. He was intensely loyal and his honesty was never questioned. He possessed a most marvelous faith in humanity. To illustrate this particular quality of mind an incident should be mentioned. With possibly one or two exceptions, he never refused to ship insecticide to anyone who ordered it, regardless of their financial condition or standing. During all his business experience of about fourteen years, he lost practically no money from bad accounts.

Besides his wife, a brother, William Schnarr, survives him.

### CHARLES PUGSLEY

Mr. Charles Pugsley was born December 5, 1851, in Athens County, Ohio. The family of eight moved west in 1855, settling in Harrison county, Iowa, on a farm, where he had the advantages of the common school, high school being out of the financial reach of the small farmer in that day and place.

At the age of twenty-one he associated himself with his two older brothers in the

growing of nursery stock. After this experience he went to Texas, where he spent a season on a sheep ranch. During the years 1883-1884 he had his first residence in Florida, coming to Mannville with his father, who settled there on a tract near town.

In the fall of 1884 after spending the summer traveling in the west he returned to Mannville, and made his home with

his father's family. Here he planted an assortment of fruits which grew with varying degrees of success. His peaches bore a pleasing crop, but when the express bills were paid, he would have been better off with a complete failure. He had a promising grove of oranges beginning to bear when the great freeze of 1894-1895 killed it to the ground. He immediately ordered scions from California, sawed off the trees at the ground, and inserted grafts into the stumps, which grew nicely, and were beginning to bear when the freeze of 1899 came, and he found himself penniless.

The years 1901 to 1903 were spent at Cutler, Dade county, where he accumulated two thousand dollars raising truck. Then he and an older brother, George Pugsley, took a one-horse camping outfit and started on a search for a good location for an orange grove, driving from Punta Gorda north. They finally chose

Winter Haven, where they planted forty acres to oranges and grapefruit. This grove was coming into bearing when he engaged to manage the packing house of the Florida Citrus Exchange at Winter Haven. Failing health, however, compelled him to withdraw from hard work. The grove was sold, and he purchased a small tract near town.

During the last two years of his life he was engaged in experimenting with the avocado, planting the best and hardiest of the Guatemalan type. He was meeting with encouraging success when he was called, on October 15th, 1919. In his death the State of Florida has suffered a distinct loss, for had he lived he would have settled the adaptability of the avocado to the latitude and vicinity of Winter Haven. He is survived by his brothers, Marcellus and George, and his sister, Frances E. Pugsley.

### DAVID H. SCOTT

Mr. David H. Scott was born in Ontario, Canada, in 1868. He moved to Virginia with his parents in 1878. Came to Florida to engage in the fruit growing and shipping industry in 1893. He was a graduate of Richmond College. At

the time of his death, which occurred July 12, 1919, he owned 80 acres of bearing grove and ran a packing house in Arcadia. He leaves a wife, a daughter and a son.

### ED. SCOTT

Mr. Ed. Scott was born in July, 1866, and died at home, December 11, 1920. He was very active in promoting good roads and was a member of the State Road Department at the time of its organization. At the time of his death he

owned about twelve acres of orange grove and his principal holding was the Scott Telephone System of Arcadia. He is survived by a wife and six daughters. He was a brother of David H. Scott.

**WILLIAM NATHANIEL WILSON**

Mr. William Nathaniel Wilson, the son of Col. Lemuel and Mrs. Rafaila Wilson, was born at Newnansville, Florida, June 18, 1864. At a very early age he moved with his parents to Gainesville, Florida. In 1886 he was married to Mrs. Ruth Scarratt, who with one child, Miss Rafaila, survive him. His death occurred March 15, 1920. Though prominent as

a dry goods merchant, he was intensely interested in horticulture and truck farming and owned several large citrus groves in different parts of the State. He was also a member of the Standard Fertilizer Company of Gainesville, and Vice-President of the Gulf Fertilizer Company of Tampa.











